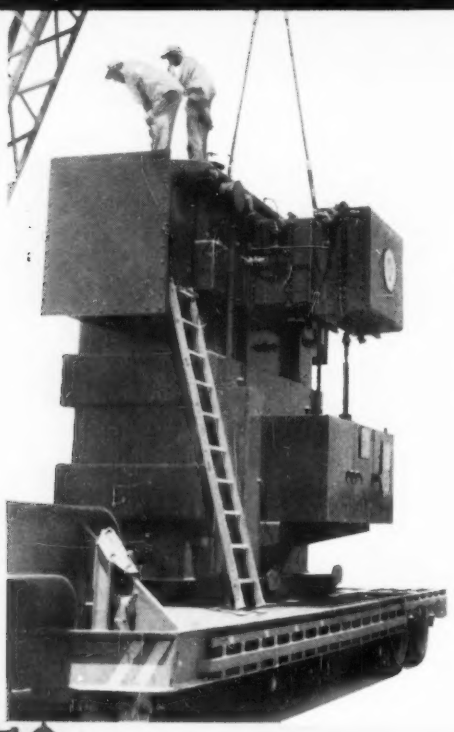
Electrical World

Rig Designed for Heavy Lifting Cuts Power Plant Construction Time and Costs.....

page 34

STEVENS RICE
UNIVERSITY MICROFILMS
313 N 1 ST
ANN ARBOR MICH

How Manufacturers View 1959 . . . p 29

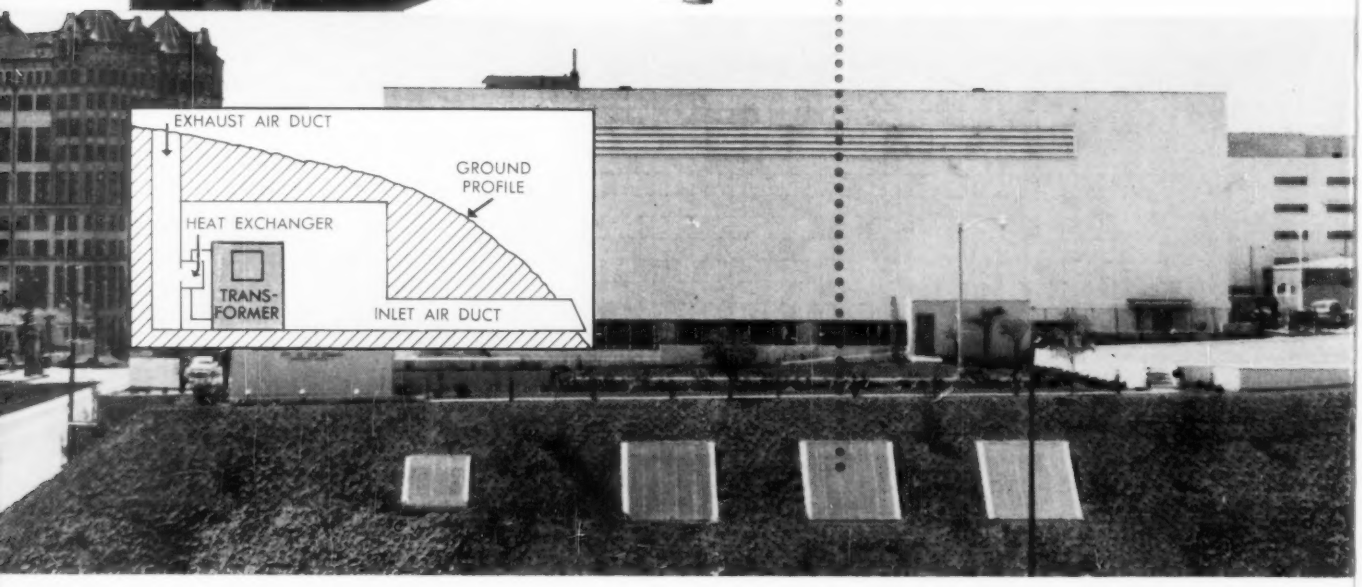


60,000 Kva

of Pennsylvania Transformer Capacity

GOES UNDERGROUND

in Los Angeles distributing station



Special cooling arrangement used in installation of three 20,000-kva load tap changing transformers

A combination of economic and esthetic factors prompted the City of Los Angeles, Department of Water and Power to construct an *underground* distributing station to supply power to the city's rapidly growing civic center. Studies indicated that an underground station would cost considerably less than a surface structure—particularly a surface structure that would harmonize architecturally with the large civic center buildings of the present and future.

Three 20,000-kva Pennsylvania Load Tap Changing Transformers are now "on the line" in this new underground distributing station. Despite space limitations, the transformers fit easily into their individual chambers—thanks to the compactness of Pennsylvania's new rectangular tank design. To solve the problem of cooling, transformer oil is pumped through flexible connectors to special oil-to-air heat exchangers (two for each transformer) that are sealed in the walls of outgoing air ducts. Air is drawn through inlet tunnels on the opposite side of the room, after which it passes around the transformer, through the heat exchangers, and into the outgoing ducts.

With more than thirty years of experience in the design and manufacture of power transformers, Pennsylvania can satisfy the usual as well as the unusual in installation requirements. For a discussion of your needs, contact Pennsylvania Transformer Division, Box 330, McGraw-Edison Company, Canonsburg, Pa.

McGRAW EDISON

PENNSYLVANIA POWER TRANSFORMERS

Electrical World

Vol. 151, No. 1 JANUARY 5, 1959

Published for 85 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

In This Week's Issue

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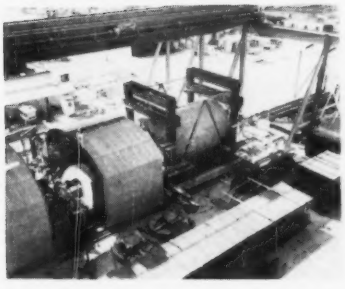

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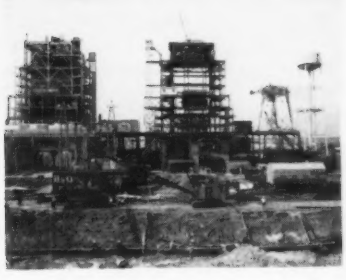

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CURRENT EVENTS

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Public-vs-private differences shelved because of 'frightening demand. Spending to total $1.5 billion in decade...p 26

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Devise Rig to Lift 165-Ton Stator

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Construction company saves time and trims cost in setting generator part at Gulf States Utilities' Neches station.....p 34

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Texas Loads Continue to Mount

Air conditioning, new industries push area loads upward; utilities step up expansion to meet anticipated demands....p 38

TRANSMISSION

Armless Poles Carry 68-Kv Line

New design saves up to third of structure cost, allows longer transmission spans, cuts radio noise level.....p 31

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One construction, one basic cable design finds many uses. Open coal conveyor structure shown under construction above carries Okolite-Okoprene power and control cables from Metropolitan Edison Company's new Portland Generating Station to coal storage yard. Three types of the same cable meet in the tunnel (right) beneath the switching station: Okolite-Okoprene with CM-OT finish; Okolite-Okoprene with aluminum Loxarmor; Okolite-Okoprene with straight Okoprene sheath.

Another leading utility picks
Okolite-Okoprene for maximum margin of safety

Utmost reliability, proved by long-term service records, is the reason why Okolite-Okoprene was selected for the brand new Portland, Pa., Generating Station of the Metropolitan Edison Company—engineered by Gilbert Associates, Inc. Various Okolite-Okoprene cables have been installed for 600-volt power and control service with protective coverings designed for specific installation conditions. For example:

- **To avoid expense of conduit...permit quick addition of new circuits**...Okolite-Okoprene power cable with flexible aluminum Loxarmor, in trays, carries power to motors, pumps, coal conveyors, fans and practically all other operating equipment.

- **For maximum protection against soil corrosion, mechanical damage and insect attack**...Okolite-Okoprene control cable with Type CM-OT (corrugated bronze tape) finish is used for direct burial underground circuits to the switching station in the yard. Finish combines remarkable compressive strength with light weight and easy handling.

- **For great weathering strength and resistance to abrasion**... Okolite-Okoprene control cable with an overall Okoprene sheath is used for most other control circuits within station ...and installed in outdoor trays leading to coal storage yard.

Power stations from coast to coast rely on Okolite-Okoprene for vital power and control circuits—a testimonial to its dependability . . . its long life and dielectric strength . . . its resistance to corona cutting, moisture, heat, chemicals and mechanical damage. For further information on this premium quality cable, made by Okonite's exclusive strip-insulating process . . . and its adaptability to your important circuits, write for Bulletin EW-1085, The Okonite Company, Passaic, New Jersey.

where there's electrical power... there's **OKONITE CABLE**

6358

Modernization Series Honored

The series of five modernization issues which Electrical World published in October and November of last year won intramural recognition last week. The McGraw-Hill editorial board judged the series to be the best of any produced by the more than 30 McGraw-Hill publications.

While we appreciate the honor, we are primarily interested in the results which we hope this series will foster.

The modernization campaign was a company-wide, recession-combatting measure. It was aimed at encouraging American industry to modernize plant for more economical production.

Our own particular effort sought to present the latest techniques and designs as well as general concepts for modernizing the electric utility industry. We will count our effort successful only if it has helped you, our reader, in your daily task, whether it be managing, designing, constructing, operating, or maintaining the nation's utility systems.

If you have found specific application for some of the ideas put forth in our modernization series, would you drop us a note that we could share with other readers?

Fischer Black

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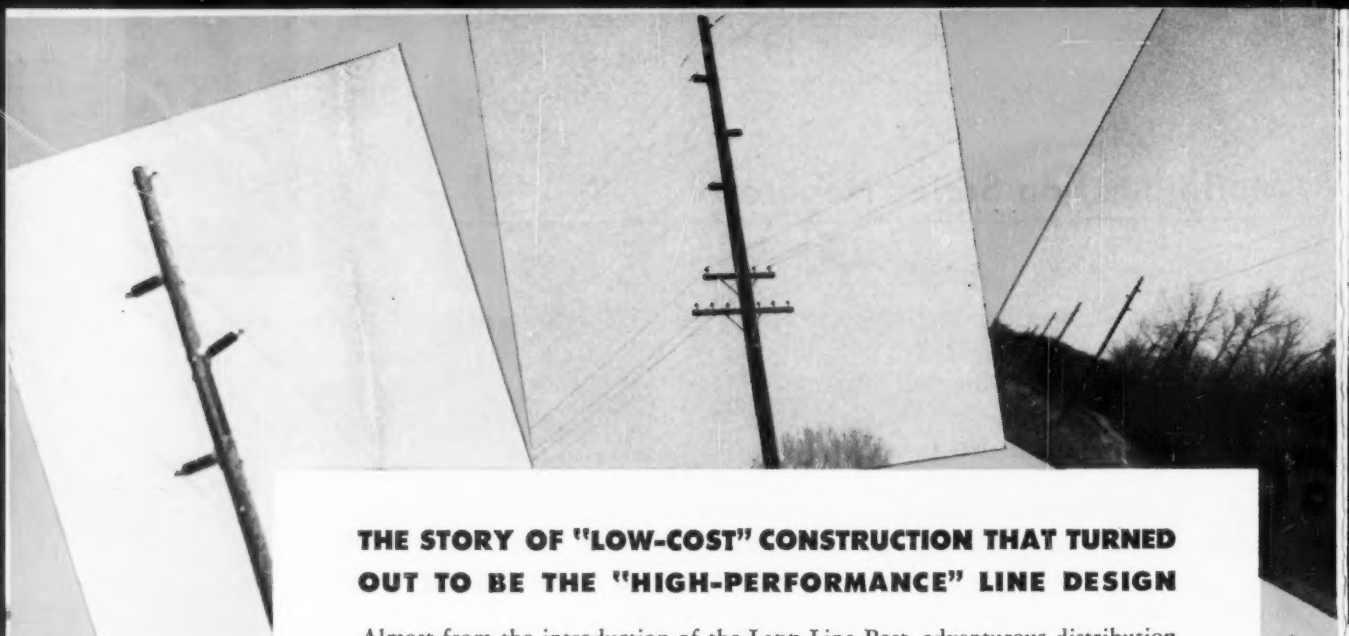


THE STORY OF "LOW-COST" CONSTRUCTION THAT TURNED OUT TO BE THE "HIGH-PERFORMANCE" LINE DESIGN

Almost from the introduction of the Lapp Line Post, adventurous distribution and transmission engineers started experimenting with lines on which conductors were carried on Line Posts horizontally mounted and bolted directly to wood poles.

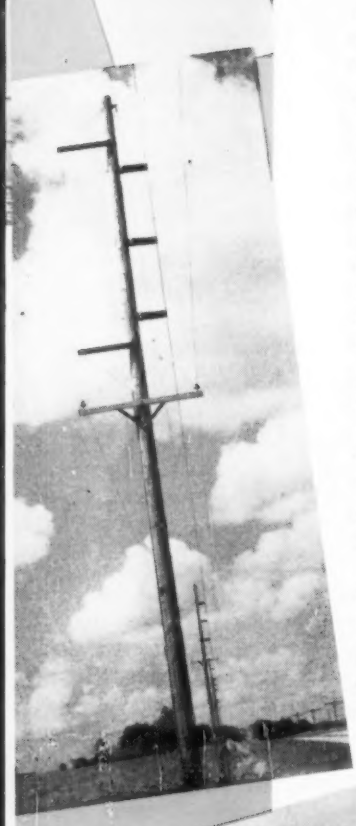
Nobody could question the *economy* of such construction. About a 25% saving in labor. And, of course, elimination of cost for a lot of crossarms, bracing and hardware. Made an unobtrusive, trim-looking line, too. And certainly a line requiring the narrowest right-of-way you could dream up.

Well, through the years a number of such lines have gone into service, at voltages 13.2 kv to 69 kv, a few of which are shown in snap-shots here. Some of these lines now have been in service for more than 20 years. And, as we've already hinted in the headline to this piece, the service records they've built have been simply remarkable. More than one utility official has told us "the only completely trouble-free line we've ever operated."

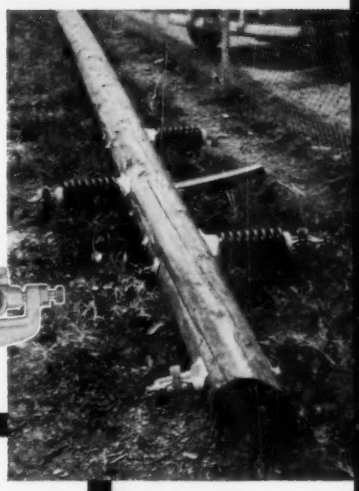
There are sound reasons why this should be so, understandable in terms of Lapp Line Post characteristics. In the first place, it's a sturdy one-piece porcelain body, with its hardware attached externally, to impose only large-area low-intensity compression forces on the porcelain. It is the one line insulator mechanically suited to horizontal mounting.

But it's in electrical characteristics that horizontal mounting makes Line Posts shine! Wet flashover values are increased by as much as 15% over upright ratings . . . because more insulator surface is exposed, wetting is more uniform. Natural cleaning is better in wind and rain, too; dry shadow areas are eliminated, reducing incidence of pole fires and contamination flashovers.

We've been encouraged . . . in fact pursued . . . to do something to get this sort of construction standardized. What we've done we're glad to tell you about . . . on the opposite page.



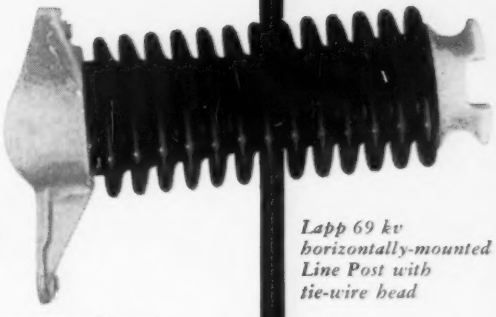
Entire structure is easily assembled on the ground before erection



Lapp 69 kv horizontally-mounted Line Post with trunnion conductor clamp

and now...

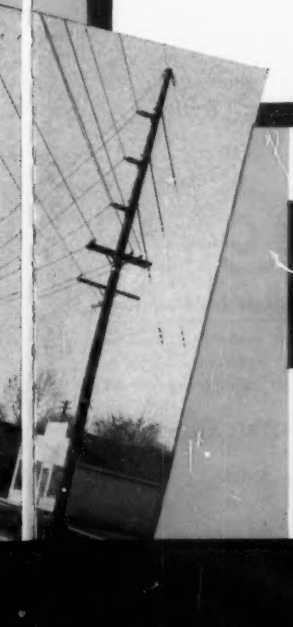
LAPP LINE POSTS SPECIFICALLY DESIGNED FOR HORIZONTAL MOUNTING



Lapp 69 kv horizontally-mounted Line Post with tie-wire head

A new series of Lapp Line Posts for horizontal mounting is now offered in six voltage ratings: 35 kv, 45 kv, 55 kv, 66 kv, and 88 kv. The bases are malleable iron castings with a mounting radius which will provide maximum contact to Class 1, 2 and 3 poles. Insulators are bolted directly to the pole by bolts at top and bottom of the base. This design provides that full cantilever strength of the insulator be developed with little deflection, and without failure of pole or mounting bolts. (Compare this with typical crossarm construction, where failure of braces or splitting of crossarm would occur at a value far less than the 2800 lbs. for which the insulator is rated.) In addition, longitudinal loading is possible at a value at least 50% more than can be withstood by crossarms. This extra strength permits use of longer span lengths, larger conductors and greater factors of safety.

By use of a simple outrigger shield wire and ground wires, it is practical and economical to achieve a structure flashover value with horizontally-mounted Line Posts greater than that of a typical wood-crossarm wood-brace vertical insulator assembly . . . with no possibility of wood burning or splitting. This is explained in Lapp Data Sheet No. 539, a copy of which is yours for the asking.

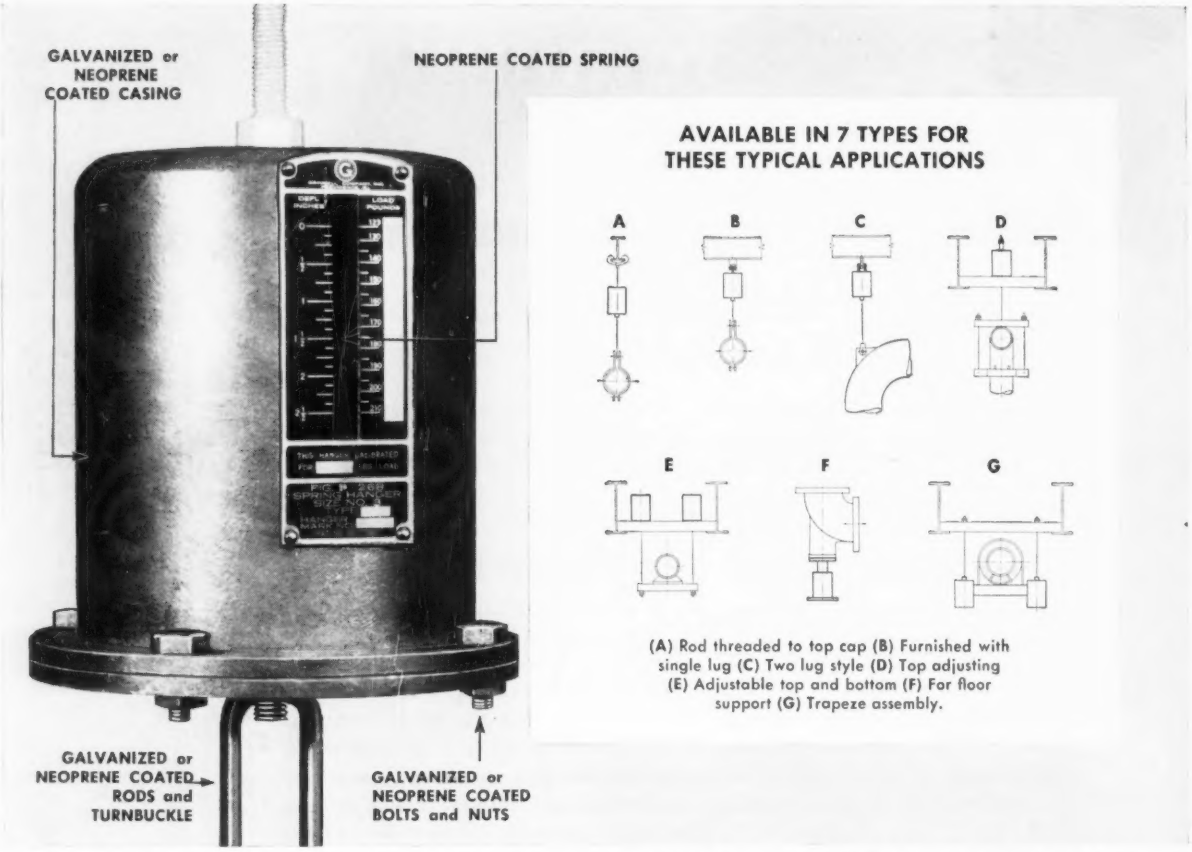


Lapp

LAPP INSULATOR CO., INC., LE ROY, N. Y.

corrosion-resistant, weather-resistant

GRINNELL VARIABLE SPRING HANGERS


GALVANIZED or NEOPRENE COATED CASING
NEOPRENE COATED SPRING
GALVANIZED or NEOPRENE COATED RODS and TURNBUCKLE
GALVANIZED or NEOPRENE COATED BOLTS and NUTS
AVAILABLE IN 7 TYPES FOR THESE TYPICAL APPLICATIONS
A
B
C
D
E
F
G
(A) Rod threaded to top cap (B) Furnished with single lug (C) Two lug style (D) Top adjusting (E) Adjustable top and bottom (F) For floor support (G) Trapeze assembly.

In addition to their proven corrosion and weather resistance, these spring hangers offer other features.

- Maximum variation in supporting force for standard spring models per ½" of deflection is 10½% of rated capacity — in all sizes.
- Precompression (a patented feature) assures operation of spring within its proper working range, as well as saving valuable erection time. Reduced over-all height saves space.
- 21 sizes available from stock for load ranges from 50 lbs. to 28,200 lbs.
- Available in 3 spring lengths for maximum travel of 1¼, 2½, and 5 inches.
- Installation simplified by integral load scale and travel indicators.
- All-steel welded construction meets pressure piping code.

For hanger installations which are subject to highly corrosive industrial conditions — or where exposed to severe weather, Grinnell makes available two distinct lines of pre-engineered spring hangers.

These hangers are the result of extensive experimentation with various coatings for Grinnell's standard pre-engineered spring hangers. In addition to providing flexibility in pipe suspension, they provide versatility of application through their corrosion-resistant characteristics.

1. NEOPRENE COATED – for highly corrosive conditions, such as those found in chemical plants and refineries. All parts of the hanger are neoprene coated to protect the base metal from a wide range of corrosives. The flex life of the spring is unaffected by the neoprene . . . the coating resists cracking or flaking over a wide temperature range.

2. GALVANIZED – for outdoor installations, where weather conditions are severe. All parts of the hanger are galvanized except the spring, which is neoprene coated to avoid alterations of temper, hydrogen embrittlement and decreased flex-life of the spring – usual hazards to springs from the galvanizing process. Write for further details.

GRINNELL

AMERICA'S #1 SUPPLIER OF PIPE HANGERS AND SUPPORTS

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

pipe and tube fittings • welding fittings • engineered pipe hangers and supports • Thermolier unit heaters • valves
Grinnell-Saunders diaphragm valves • pipe • prefabricated piping • plumbing and heating specialties • water works supplies
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

JOSLYN TYPE MV-131 400-watt MERCURY LUMINAIRES

WITH SPECIAL HEAT-RESISTANT GLASSWARE AT NO INCREASE IN PRICE

LIVE BETTER ELECTRICALLY

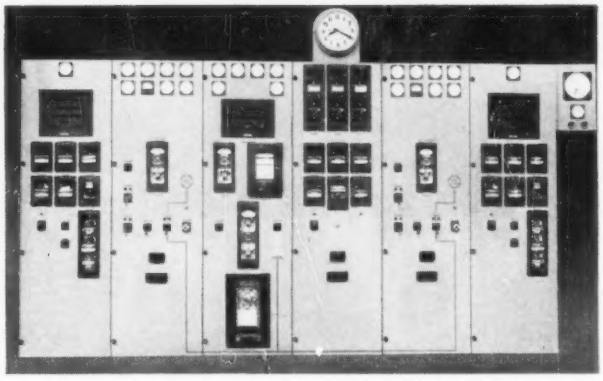
JOSLYN ® COMPLETE POLE LINE EQUIPMENT

JOSLYN MFG. AND SUPPLY CO., 155 N. WACKER DRIVE, CHICAGO 6, ILLINOIS

in metal-clad switchgear...

Reliability

is born of many men's efforts



Indoor metal-clad power plant switchgear rated 4160 volts, 3 phase, 60 cycles supplied to a partially attended generating station.

It started with a directive—"Make it the best!" A creative team set out to implement this decision. Engineers, designers, production men, and marketing personnel—all took up the challenge. What was *then* good gave direction. They added their talents, their skill, their experience—up-to-date application requirements—designing, testing, redesigning until drawing board plans were translated to market place reality. Out came metal-clad switchgear preeminent in strength, simplicity, and performance. They *had* made it the best!

Type DST air circuit breaker—5 kv, 250 mva, 1200 amps.

From simple feeder circuits to complex generating station protection—when you specify Federal Pacific metal-clad switchgear, you specify reliability. Proof is yours for the asking. Write Federal Pacific Electric Company, Newark, New Jersey for Catalog 3-440—sixty-four pages of the latest in metal-clad switchgear information.

FEDERAL FPE PACIFIC

The Best in Electrical Distribution and Control Equipment

The Electrical Week

FUTURE NEWS ▶ **Look for changes in the formula** on which Ohio utility rates are based. Gov-elect M. B. Disalle and the Democratic majority in the legislature are committed by the party platform to try to repeal the "Reproduction Cost New" formula.

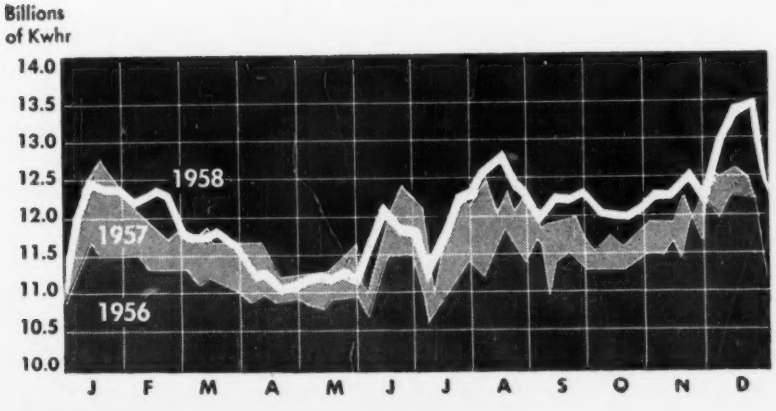
LATE NEWS ▶ **Top officials of the Atomic Energy Commission** deny reports that AEC has decided to push development of only five types of reactors. However, the tight budget which Eisenhower is expected to submit in January may reflect some narrowing of the field.

Pierceton, Ind., Town Board accepts $165,000 bid from Northern Indiana Public Service to buy the town-owned utility . . . Clyde, Ohio, employs Hoch & Associates, Akron, to make survey to determine whether its plant should be sold or improved . . . Decatur, Ind., City Council orders referendum election for Feb. 24 for voters to decide whether to keep or sell its plant. Even if the sale is rejected, the city plans to close down the steam plant and buy all but emergency power from Indiana & Michigan Electric Co, the possible buyer.

Rates and Regulations . . . Ohio Edison asks Youngstown City Council to approve a 7.2% hike in commercial and residential rates . . . Ohio Power Co gets PUC okay to up its rates anytime the cost of coal jumps as much as 11¢ a ton. Company says a 11¢ a ton increase will mean an 18¢ a year increase in the customers bills.

Management changes . . . American Electric Power Service Corp elects P. W. Emler to commercial vp and J. H. K. Shanahan to assistant commercial vp . . . R. W. Smith and H. A. Strickland, Jr, are new vp's of GE . . . Square D names M. P. Kartalia a vp.

POWER OUTPUT—UP 10.3% (Week ending Dec. 27), Kwhr 12,379,000,000



Per Cent Change From Previous Year

	Dec. 13	Dec. 20	Dec. 27
Total U. S. ...	+7.0	+9.0	+10.3
New Eng. ...	+9.6	+11.4	+12.1
Mid. Atlantic .	+6.4	+7.9	+9.9
Cent. Ind.....	+7.7	+9.9	+11.9
West Cent....	+9.4	+10.0	+12.2
Southeast	+5.1	+10.2	+10.0
South Cent...	+8.3	+6.5	+9.6
Rocky Mount..	+7.6	+7.6	+7.8
Pacific			
NW	+7.3	+7.0	+8.3
SW	+6.3	+7.9	+8.5

Seasonally Adjusted Index 244.8
Week Ago 246.1 Year Ago 221.2

Source: Edison Electric Institute

Preview of this Issue

EVENTS ▶ **The electrical manufacturing industry looks optimistically** at 1959, according to year-end reports issued by NEMA and the manufacturers themselves. For a roundup of reports and predictions, see **p 29** . . . Mexico is gearing up to meet a huge power demand. Public vs private differences have been shelved as the industry readies itself to meet demands of $1.5 billion in new facilities in the next decade **(p 26).**

ENGINEERING ▶ **A custom designed rig to raise generators has been built** by Stone & Webster. The movable steel jacking structure is said to cut costs and time on the job. The pictorial spread that is this week's cover story is on **p 34** . . . Armless structures on new 69-kv transmission lines feature simple design and construction, lower noise levels, lengthen spans and cut costs below those of conventional lines **(p 31)** . . . Texas utilities' loads continue their rapid growth, and system expansion plans have been stepped up to meet present demands and those anticipated for the next few years **(p 38).**

MANAGEMENT ▶ **Sacremento Municipal Utility District uses fair value depreciation.** While investor-owned utilities have been urging commissions to recognize the need for economic depreciation, this California municipal has gone ahead and done it. Implications are discussed in this week's

Politics and Public Power

Att'y General Campbell has backed down still further from his controversial ruling that REA cannot legally grant co-ops loans to build new power lines in competition with existing power companies.

Campbell had criticized the $120,000 portion of an REA loan to Central Iowa Power Co-op, which had been used to finance a new line to serve an industrial customer located only 160 ft from an existing Iowa-Illinois Electric Co line (EW, Aug. 11, 1958, p 35).

In a new letter to Agriculture Secy Benson, Campbell said, "We (the GAO) will not attempt to recover any future similar loans nor take any other action concerning the present Administration practice in the absence of an expression of congressional intent to the contrary." However, Campbell still plans to bring the CIPCO loan to the attention of Congress in his annual report. But he does not plan to issue new opinions or put pressure on REA in the future involving similar loans "under the circumstances"—namely, that Congress has been "aware" of such loan practices for 22 years, and has apparently "acquiesced' in them.

Originally, Campbell demanded that REA recover the $120,000 immediately from CIPCO. Faced with a stout rebuff from Agriculture that REA was administering the act properly, Campbell in October reconsidered his ruling by: (1) defining areas off-limits to REA loans when they are directly along existing power lines or within a "reasonable" distance from them; and (2) dropping his plea that the CIPCO loan be recovered immediately, as it has already been spent and the line was operating.

Agriculture still refuted Campbell's opinion, and stated that it would continue to make loans as it had in the past until ordered to change by Congress. Because the GAO is

Management Newsletter (p 51) . . . Fuel economies, made possible largely through its famous coal pipeline, and a rapid business recovery, have helped Cleveland Electric Illuminating maintain 1958 earnings at about the 1957 level (p 53).

MANUFACTURERS ▶ **Westinghouse consolidates distribution apparatus operations** in its new plant near Bloomington, Ind. Facilities for design, manufacture and marketing are provided for on a 148-acre tract. Devices to be produced include power capacitors, lightning arresters, fuse cutouts, oil circuit reclosers and switches (p 43).

NEW EQUIPMENT ▶ **LTC transformer provides individual voltage regulation** for each phase . . . Voltage regulators in three high-current ratings are additions to RSD pole-type line . . . Oil circuit breakers are available in a new line for either indoor or outdoor service (p 56).

SELLING ▶ **Highlights of the Southeastern Electric Exchanges Sales Conference** are on p 64 . . . Florida Power Co accepts LBE award (p 64).

PEOPLE ▶ **J. E. Loiseau is new board chairman of PS of Colorado,** and R. T. Person is new president. These and other personnel changes on p 66.

an arm of Congress, and cannot make executive agencies comply with its decisions, the ruling appears deadlocked until Congress considers the matter. Campbell's complaint is likely to get nowhere in the new Democratic Congress, and his latest letter to Benson looks like a hint that he would like to see the matter dropped . . . tactfully.

"Buy American" . . . Mid-February now appears to be the earliest that the Office of Civilian and Defense Mobilization can rule on U. S. electrical manufacturers' petitions that imports of heavy electrical equipment are hurting the nation's security (under the Buy American and Reciprocal Trade Acts.)

OCDM has permitted the petitioners to file rebuttal briefs in early January to answer statements filed in December by foreign manufacturers. And OCDM is also waiting for additional comments from several government agencies—Defense, State, Commerce and Interior Departments, the AEC, and a special survey by the FPC. The Office has received a complete report only from the TVA.

A final decision by OCDM is expected to take at least a month after the mid-January deadline for all reports. Its ruling must then go to the White House for final approval.

Political briefs . . . A bill authorizing a nuclear power plant in TVA territory will probably be introduced early in the coming session by one of the senators from Tennessee . . . National Rural Electric Cooperative Association is considering a plan—a National Trust Fund—to help member co-ops invest surplus funds . . . Be sure to read the story on the comments from various segments of the industry on the Joint Committee on Atomic Energy's report on its long-range A-power program (p 24).

Pipeline transportation of Texas lignite for distances less than 100 miles would cost more than truck or rail shipment because of degradation and expense of dewatering, concludes the Bureau of Mines from a study conducted with Texas Power & Light Co. **Report R. I. 54-4, "A Study of the Feasibility of Hydraulic Transport of a Texas Lignite," Publications-Distribution Section, Bureau of Mines, 4800 Forbes St, Pittsburgh 13, Pa.**

TECHNICAL NOTES

Eddy currents in the transformer core can only prevent magnetic flux from penetrating into the laminations for a few microseconds. Thus, inductive coupling between windings during a surge is not less than that for normal power-frequency.

Fuel elements always will be a limiting factor in nuclear reactor efficiency and reliability.

About 1,000 tons of aluminum, or 5.23 lb per kw of installed capacity, will be used in a 375,000-kw steam plant for Alcoa's aluminum smelter in Warrick County, Ind.

Neutral shift during phase-to-ground faults can materially increase the voltage across the breaker contacts connected to the two unfaulted phases. This increased voltage can affect restriking and switching surges.

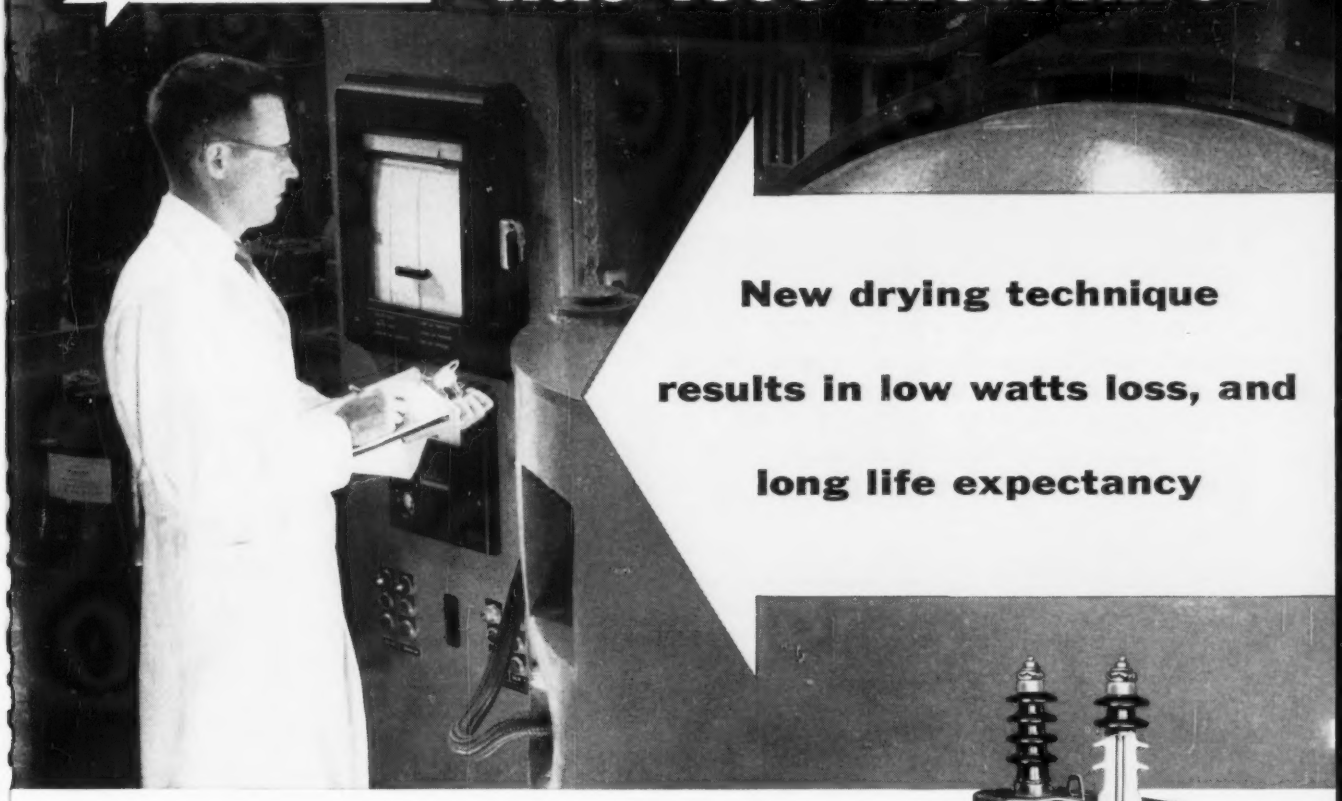
Converter scheme for extra-high capacity dc transmission can be made insensitive to lapses in ignition of individual rectifiers by a series-parallel connection of six units per arm.

No spacers are needed in a two-conductor vertical bundle if spacing is 16 in. or more. Vertically spaced conductors offer only a slight chance to cling together due to wind action or short circuit.

FROM EDITORS IN THE FIELD

Semi-annual meter reading is working successfully in Bordeaux, reports Electricite de France. Under the plan customers are billed bi-monthly based on the previous year's usage. Underpayments are billed or overpayments refunded after each meter reading.

VAREX® has less moisture!



New drying technique

results in low watts loss, and

long life expectancy

A combination of two drying methods is used to remove moisture from the inside of a capacitor prior to impregnation with askarel.

1 - - *High temperature.* This part of the combination is limited since above 135 degrees C. the heat will deteriorate the insulating paper.

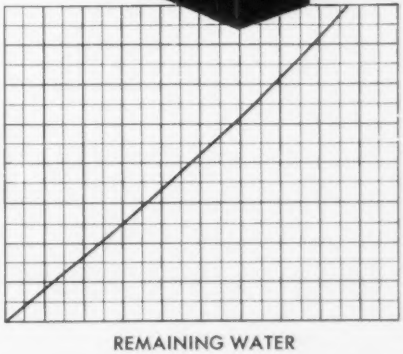
2 - - *High vacuum.* Here the only limitation is the effectiveness of the pumping equipment and the arrangement for coupling it to the capacitor.

O-B has developed a low absolute pressure (high vacuum) drying system for Varex that removes the maximum amount of moisture. This is not just a claim; it can be definitely measured.

Why is this significant to you? The almost complete lack of moisture is reflected in a low power factor for Varex units. Watts loss per KVAR is low, so that less heat is generated in the insulation than in capacitors with higher moisture content.

With less heat, the capacitor insulation lasts longer. And that's why you can expect long life and top performance when cool Varex capacitors are installed on your lines.

OHIO BRASS COMPANY, MANSFIELD, OHIO

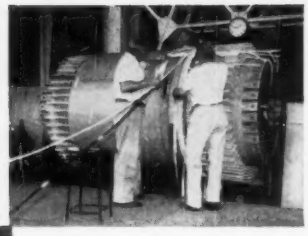


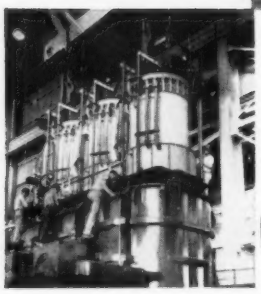
For a given temperature, the lower the drying pressure the more moisture is removed. Drying pressure for Varex is on the order of 15 microns.

Ohio Brass HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

4868-H

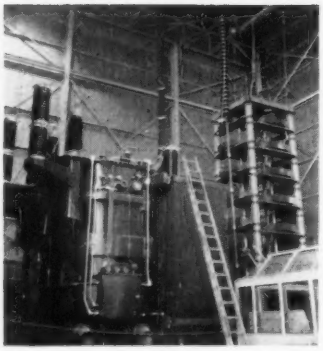




OF SKILL AND FACILITIES

Moloney's growth has paralleled that of the electric industry. This growth has been possible because of experience and know-how, skill and facilities . . . all backed by constant research and development programs which have sparked many industry firsts.

Moloney carefully studies industry trends, and utility needs are anticipated whenever possible. Co-operative development between Moloney and their customers is constant in both specific and industry-wide instances.



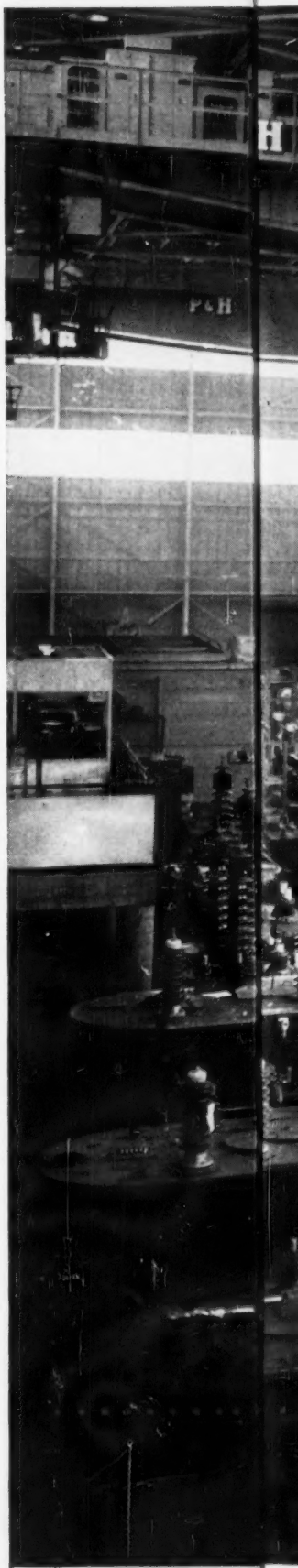
Skill and Facilities to manufacture large transformers of any type or size required . . . over sixty years experience in the manufacture of transformers . . . continuous product improvement . . . proven service records on utility systems throughout the country . . . are all good reasons for specifying Moloney Transformers . . . All Along the Line.

MOLONEY ELECTRIC COMPANY

Manufacturers of Transformers for Utilities, Industry, and Electronic Applications

ME58-24

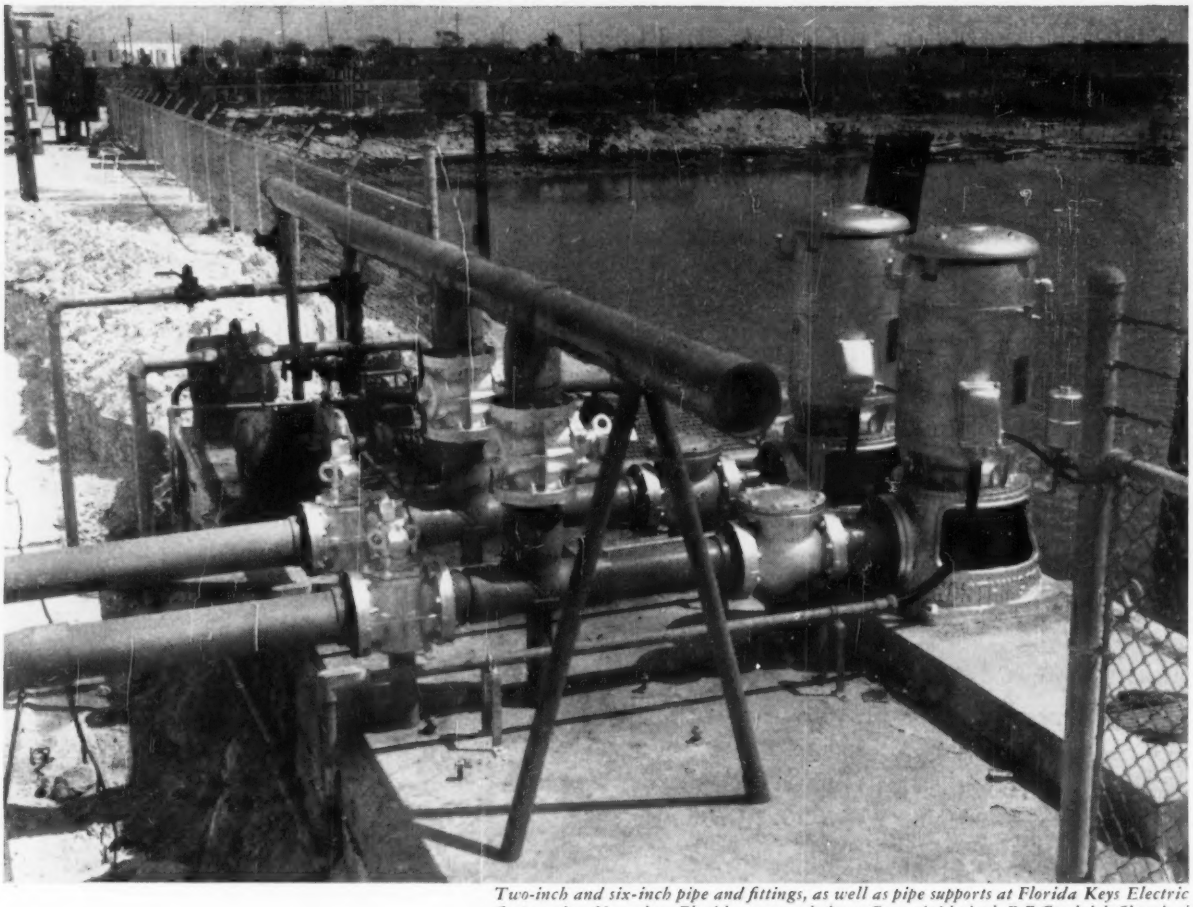
SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA



MAGNETORQUE CONTROL
MOLONEY
ELECTRIC

News about

B.F.Goodrich Chemical *raw materials*



Two-inch and six-inch pipe and fittings, as well as pipe supports at Florida Keys Electric Cooperative, Marathon, Florida, are made from Geon rigid vinyl. B.F.Goodrich Chemical Company supplies the rigid vinyl material only.

Pipe of Geon cures corrosion caused by ground currents

SEA water is used in the raw water system of this diesel generating plant, and electrolytic corrosion of the metal piping in the raw water system created quite a problem. Then pipe made from Geon rigid vinyl was installed and, after two years of operation, there is no corrosion problem in the piping handling the sea water.

The addition of a larger diesel unit to the plant now calls for six-inch pipe made from Geon rigid vinyl to handle the salt water used in cooling the diesels and lubricating oils, and for piping Bunker C fuel oil from the oil storage tanks to the plant. Even the pipe supports are made from Geon rigid vinyl.

Pipe of Geon is the logical choice wherever corrosion causes problems. And there are installation savings, too. Pipe of Geon is lightweight and easy to handle. Contractors like it. Can be readily joined by solvent welding or standard threaded fittings.

How can you benefit from pipe made of Geon rigid vinyl? Get information by writing Dept. **LR-1**, B.F. Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio.

Cable address: Goodchemco.
In Canada: Kitchener, Ontario.

B. F. Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich

GEON polyvinyl materials • HYCAR American rubber and latex
GOOD-RITE chemicals and plasticizers • HARMON colors

WHEN PROLONGED OVERLOAD overheats the transformer windings, top oil temperature rises; tank wall gets hotter; and the L-M Thermal Overload Indicator drops its red signal light or luminous yellow tube to indicate the overload. No interruption of service; no costly periodic load checks. Fits any make of conventional transformer up to 100 kva.

Utilize Full Transformer Overload Capacity With L-M Thermal Overload Indicator

Cuts costs of load checks; helps maintain continuity. Alnico magnetic mounting bracket makes installation easy on *all* makes of conventional transformers. Choice of red signal light or luminous yellow tube signal.

Utility companies have been buying L-M's Type D Thermal Overload Indicator in large quantities for a number of reasons. The unit is simple; it is easy to install; and the cost is less than a $10 bill.

The indicator eliminates costly periodic load checks, by providing a *continuous* load check instead. It helps prevent transformer burnouts by giving ample warning. In addition, it avoids service interruptions because it doesn't cut off the transformer load; it simply *indicates* the existence of an overload.

L-M's indicator, compensated for ambient temperatures, measures tank-wall temperature, which in turn reflects top oil and hot-spot temperatures. It indicates a prolonged overload with a red light that drops down and turns on, or with a drop-down luminous yellow tube.

The small cost provides a most favorable return in both savings and service continuity. Ask the L-M Field Engineer for Bulletin 57105 or a sample. Or write Line Material Industries, Milwaukee 1, Wisconsin.

ALNICO PERMANENT MAGNET holds the L-M overload indicator firmly to the tank wall.

LINE MATERIAL® Industries

McGRAW-EDISON COMPANY

Protective Equipment

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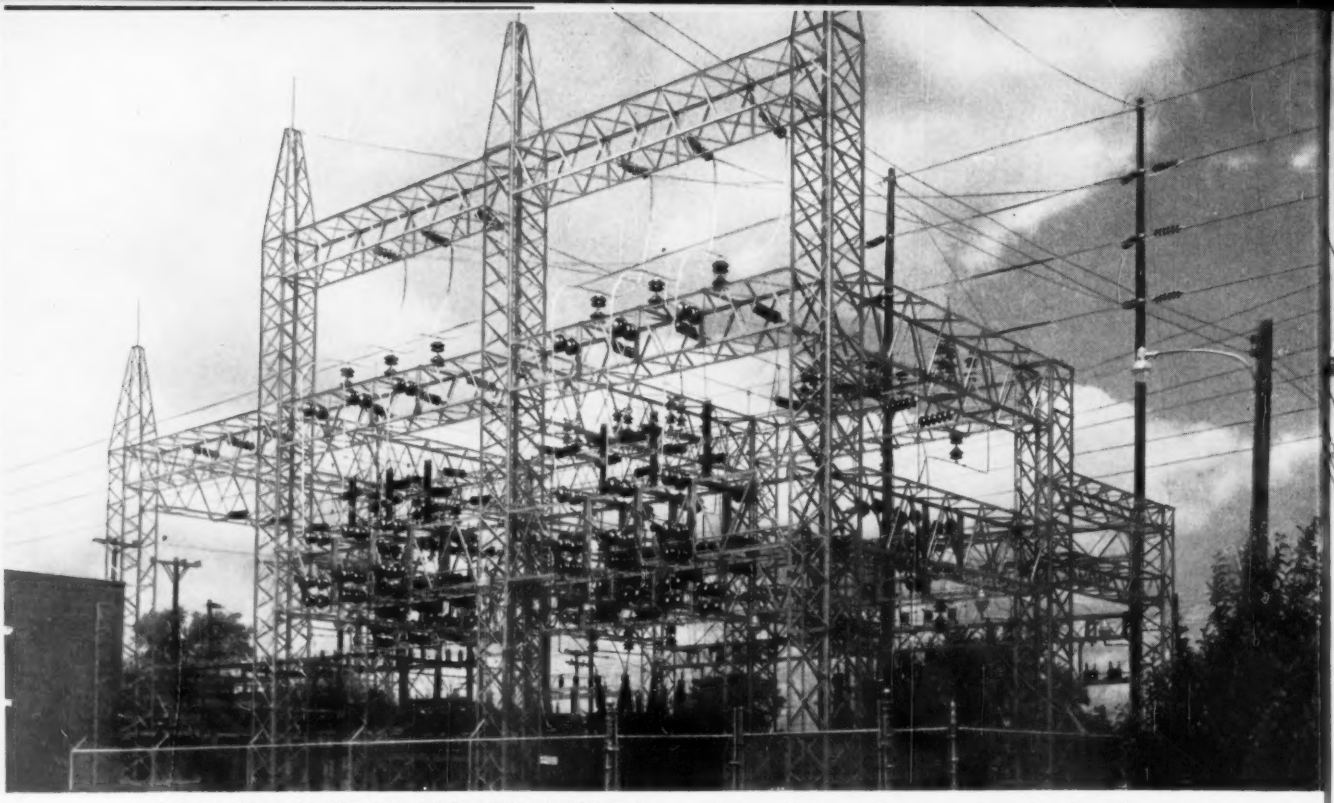
DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT



LARGE URBAN-TYPE L-M PACKAGED SUBSTATION, designed by Line Material and erected in minimum time with L-M prefabricated steel. Incoming lines are 69 kv; outgoing are 7.2/12.47 kv. L-M engineers design these packaged stations in sizes from 5 to 161 kv, for industrial plants, and for rural and urban locations on utility company lines—all with completely coordinated plans, structure, and equipment.

L-M-Engineered Packaged Substations Save Planning and Construction Time

by **W. V. SWAN**, Product Manager
Substations and Power Switching Equipment
Line Material Industries

Line Material packaged substations offer wide choice of design and application; considerable flexibility and provision for future expansion; great savings in engineering and ordering for utilities. And, because of L-M's unique prefabricated steel structure, these substations are fast and easy to erect.

One Order Does It!

Completely coordinated L-M substations need only one order; are delivered either as one shipment or coordinated to your construction schedule. It's easy to order an L-M substation. Just give us a one-line diagram of what you want—or tell us your voltage, kva requirements, number of incoming lines and outgoing feeders, and area available—and we'll design your substation for you!

Fast Erection

L-M's pre-engineered steel trusses and columns are completely prefabricated, and shipped knocked down or factory-assembled. Structures are steel, or aluminum alloy. Members have round holes punched at 3-inch intervals (before galvanizing) with square holes every foot. This eliminates measuring and drilling, and damage to galvanizing. Holes accommodate all bolts for lacing members and apparatus. That's why they go up so fast.

Prompt Shipment

Structural steel can be shipped in 3 to 4 weeks after final approval of order; complete stations in 4 to 12 weeks. Station design provides for easy, safe accessibility to all equipment. Stations meet NEMA, ASA and AIEE standards.

Ask the L-M Field Engineer for complete information and bulletins; or write Line Material Industries, Substation Department, Milwaukee 1, Wisconsin.

LINE MATERIAL Industries
McGRAW-EDISON COMPANY
Packaged Substations

McGRAW-EDISON

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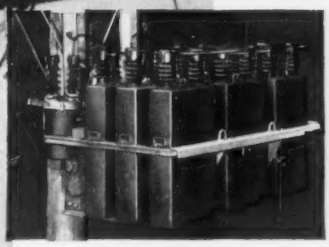
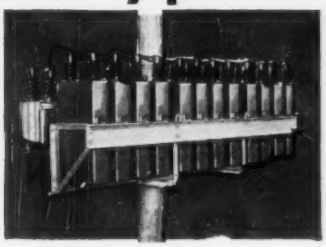
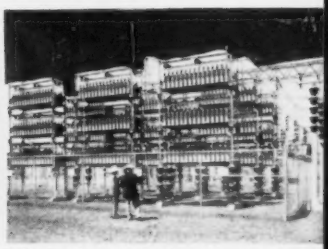
L-M Offers Complete Capacitor Line for Block-Type Banks, Pole-Type Racks



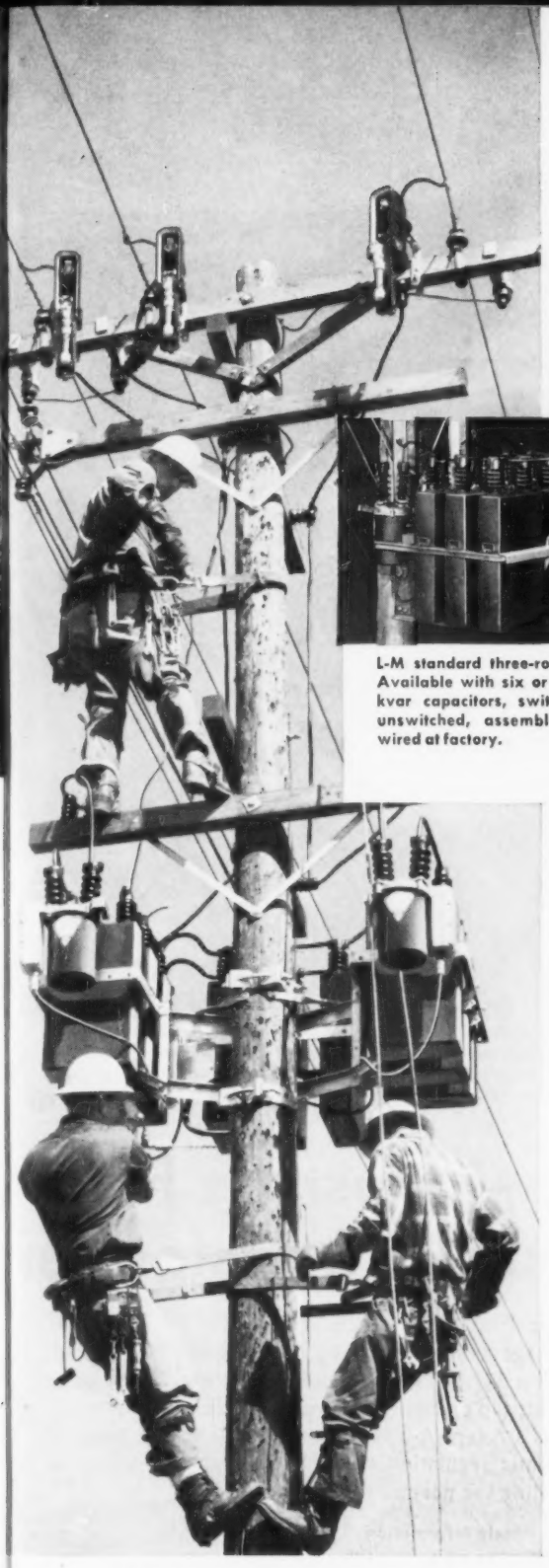
L-M standard three-row rack. Available with six or nine 50 kvar capacitors, switched or unswitched, assembled and wired at factory.



L-M single-row rack. The one shown here is 600 kvar, with three Kyle oil switches for 3-phase application. Switches may be remote-manually operated, or connected to voltage, current, or other controls.



L-M 50 kvar capacitors assembled in blocks form this 40,500 kvar 230 kv bank—said to be the highest voltage shunt capacitor bank in the country. Blocks are assembled and prewired, with fuses.



L-M 750 kvar switched cluster-rack, containing 15 50-kvar Elemex capacitors and remote control Kyle oil switches. This design rack gives the least bending moment on the pole, as weight is distributed almost evenly around the pole.

L-M, a leader in capacitor application engineering, also has excellent field experience in Elemex capacitor performance. L-M offers everything from a 3-kvar secondary capacitor to design and equipment for 230 KV banks.

by **N. K. DELANEY,** Product Manager, Capacitors and Regulators

L-M engineers have achieved an enviable reputation for capacitor application engineering service, and this has enabled us to offer extra and specialized assistance to the engineering departments of our utility friends with whom we cooperate.

We have also been fortunate in having gained an excellent field service record, because of our better-than-average quality. This extra quality has become standard with us, and is largely responsible for this excellent field experience.

Along with careful attention to application, our engineering department has also gone to some lengths to give us the best designs for racks and blocks, the metal-enclosed equipments, and the various low voltage and dust-proof industrial equipment included in the L-M line.

Get Data On These Racks and Blocks

Pole-type racks are available in various styles, shown in the illustrations, in various sizes, pre-wired, switched or unswitched. Ask the L-M Field Engineer for help on your problems and for information on our capacitor equipments. Or write me at Line Material Industries, Milwaukee 1, Wisconsin.

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LINE MATERIAL Industries *Elemex Capacitors*

McGRAW-EDISON COMPANY

DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS
POWER SWITCHING EQUIPMENT • PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING
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McGRAW EDISON

One of the first SRT's installed. This is a 2400/4160 volt 25 kva L-M Self-Regulating Distribution Transformer serving six homes, several of which are equipped with electric ranges, air conditioners, dryers, and other heavy consumption appliances.

Because of the SRT, customer voltage is maintained within a 3½-volt band width, providing better service to the customers by avoiding voltage drops that would reduce the efficiency of lights and appliances in these homes.

L-M SRT's Go To Work—Industry's First Self-Regulating Distribution Transformer

This SRT, like many others, is going to work to regulate voltage within a 3½-volt band width.

The SRT, announced last June, has been the year's biggest sensation in distribution apparatus. Utility executives, engineers, and operating men all over the country have asked for information. Hundreds of orders for units have been received, and are being filled as quickly as production capacity permits.

The SRT consists of an L-M Round-Wound transformer, with primary taps connected to an under-load tap changer. A control device sensitive to secondary voltage actuates the tap changer.

Voltage is centered around 120 volts, or 123 if desired, within a 3½-volt band width. An inherent time delay prevents tap changes on momentary drops.

L-M's Adapt-A-Tap feature permits a 10% range of automatic regulation to be applied above, below, or straddling the normal voltage.

Get Complete Information

Ask the L-M Field Engineer for complete information and literature on the SRT—L-M's revolutionary new development; or write Line Material Industries, Milwaukee 1, Wisconsin.

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LINE MATERIAL Industries

McGRAW-EDISON COMPANY

McGRAW EDISON

Distribution Transformers

Vice Admiral Rickover on Education

The following excerpted remarks are from a speech made by Vice Admiral Hyman G. Rickover before the Harvard Club in New York recently. Because they concern a subject that should be of concern to all thinking Americans —and electric utility men in particular—the Editors of Electrical World are publishing them with Rickover's permission as a guest editorial. They will be included in a forthcoming book by him to be published early next year by E. P. Dutton & Co.

". . . If you obtain your power from human muscle, wind, or water, you need almost no technical knowledge. To drive a gang of galley slaves, to manage a windmill or watermill does not even require literacy; but putting Faraday's invention of the dynamo to practical use in a central station power plant needed fifty years of engineering effort by well-trained people. The men who run such plants use their minds a great deal more and they need much better minds than the quondam miller or slave driver. Similarly, from the splitting of the atom in the 1930's, to the bomb in 1945, to the first practical nuclear reactor in 1953, a vast amount of intellectual effort of a high order had to be expended. Everyone involved in research, development, construction and running of nuclear power plants has had to raise his thinking and his performance to technical and administrative levels well above those required in conventional power plants. Our nuclear engineers had to be more broadly and more thoroughly educated; better grounded in basic engineering principles than the average engineer. . . The categorical imperatives of atomic energy demand that they raise their thinking and their actions to higher levels of competence . . . when we obtain energy from hydrogen fusion, still greater demands will be made on the scientific, engineering, and administrative abilities of everyone involved with this new source of power."

". . . our schools must return to the traditional task of formal education in Western civilization —transmission of the nation's cultural heritage, and preparation for life through rigorous training of young minds to think clearly, logically and independently."

". . . We have a chronic shortage of trained professionals which is not limited to scientists and engineers, but which is all-pervasive. Nor do we have enough broadly and liberally educated people with qualities of leadership to administer the work of the professionals. Because of these shortages, our most competent people are often overworked. Worse still, a less qualified man must often substitute. The result is either unsatisfactory performance or costly delay. Our educational system is simply not geared to the requirements of this scientific age. More education . . . is needed by everyone."

". . . I close with a quotation from Whitehead: 'The rule is absolute. The race which does not value trained intelligence is doomed. . . Today we maintain ourselves. Tomorrow science will have moved forward yet another step, and there will be no appeal from the judgment which will be pronounced on the uneducated.'"

Debate Looms on A-Plant Subsidies

Reaction to joint committee staff's long-range atomic program indicates a swing to incremental cost approach

Whether the federal government should extend capital subsidies to private utilities for construction of atomic power plants is shaping up as a major point of debate.

Differences of opinion — both among investor-owned utilities and equipment companies—crop up in replies to the proposed long-range development program circulated by the Joint Committee on Atomic Energy.

That program, drawn up by the committee staff and not yet endorsed by the committee itself, said the U. S. should aim at demonstration of economic nuclear power in the U. S. by 1970, and in high-cost free world areas by 1968. To achieve this, the staff proposed stepped-up research and development, and construction of ten or 12 reactors, with about 1-million kw aggregate capacity.

Anderson Hopes for Agreement

Sen Clinton Anderson (D-N.M.) hopes the document—together with comments from industry—can help the committee and AEC agree on a program. Sixty-nine equipment companies, private utilities, public power groups and reactor experts now have submitted views on the proposed program.

The committee hopes to meet with a representative group of the respondents in a closed-door "seminar" this month. A full-scale review of the program—and industry's reaction to it—is expected during the "202" hearings in mid-February.

Written comments already submitted to the committee contain few surprises. But there is an apparent swing toward the so-called incremental cost approach. Where the government now limits itself to R&D aid, this approach would have AEC paying a substantial part of the differential in capital costs between conventional and nuclear plants.

In the past, incremental cost has been favored by Willis Gale, Commonwealth Edison Co chairman; Chauncey Starr of Atomics International, and Rep James Van Zandt (R-Pa.). Sen Anderson also has indicated he may back this concept.

Until now, as a group, power companies and equipment companies have steered away from committing themselves. However, in comments to the committee, the incremental cost approach—or at least its serious consideration—is favored by such diverse firms as Allis-Chalmers Mfg Co, General Electric, Westinghouse, Pennsylvania Electric Co, American Electric Power Co., Southwestern Electric Power Co, and Consumers Public Power District.

Utilities Have Opposed Subsidies

In the past, many private utilities have opposed capital subsidies on grounds it would undercut their opposition to such public power bodies as TVA. Also, power produced at subsidized plants apparently would be subject to the preference clause under present law.

In this light, it is interesting to note that leaders of the co-op-public power bloc oppose the whole idea. They take the tack that any change in the law applying the preference principle would undercut the committee staff's statement that reactors should be federally constructed if inducements under the present partnership arrangement don't bring results.

With the heavy Democratic election victory in November, some private power spokesmen evidently figure the incremental cost approach may be the lesser of evils when stacked up against the possibility of federal reactor construction.

However, these same sources point out that Sen Anderson has never really committed himself to this approach. They are watching carefully to see if he now prefers to go further and support outright federal construction over changes in the partnership program.

Differing opinions also showed up in other portions of the committee's questionnaire. Some companies and EEI, for example, observed that the stated goal of achieving competitive nuclear power in the U. S. by 1970 was too optimistic. On the other hand, public power groups said the target date should be moved up to 1964.

Several private utilities warned against rigidity of technical objectives for the program, and argued against any government construction of full-scale power reactors.

Want AEC Leadership

A majority of replies indicated agreement with the committee concept that AEC should exercise positive leadership on designating reactor types to be pushed. However, several power companies warned it would be a mistake to centralize decision-making in AEC and the committee. Middle South Utilities, Inc, said industry should be encouraged to take the initiative in proposing reactors to AEC. Others said private companies shouldn't be put in a straightjacket by overly strict time schedules on submission of proposals.

Both the American Public Power and National Rural Electric Cooperative associations objected to the continuation of the partnership approach. APPA said that, instead, a selected number of second and third generation plants should be scheduled definitely as federal projects, and that the "second round"—under which AEC builds the reactor and sells steam to a co-op or municipal —should be reinstituted.

NRECA strongly objected to the proposal that "only experimental prototypes or projects for which no reasonable proposals have been received could be built at municipal, state or cooperative system sites. This, we believe, would effectively exclude consumer-owned electric utilities from actively participating in the . . . program."

TVA says federal power agencies should not be excluded from ownership of plants in the expanded program, nor from participation in the development of a government-constructed plant.

End of R&D Project: 'Unpopular, but Sensible'

PP&L and Westinghouse paid their own way, broke no commitments in cancelling R&D project on homogeneous reactor

The announcement that Pennsylvania Power & Light Co and Westinghouse Electric Corp had decided to drop their homogeneous reactor research and development project was greeted at once by such a roll of political drums that the facts were all but drowned out.

Last week, during a lull in the drum roll, a few clear notes could be heard: The mid-December decision to abandon the project was taken after 3½ years of research at a cost to Westinghouse and PP&L of about $9 million.

There had been no commitment to build a full scale reactor.

The project had been entirely supported by the private funds of the companies.

Not Technically Feasible

The project had been for research and development, and after 3½ years of R&D the companies had reluctantly concluded that the single-region slurry homogeneous reactor is not now technically feasible.

In 1955 the companies initiated the R&D program with the aim of determining whether or not the construction of a large-scale power plant could be justified. The homogeneous plant would use particles of uranium in a liquid slurry instead of using metallic fuel elements. Pending the outcome of this research, the decision was to be made on construction of a nuclear plant of probably 150 Mw.

In announcing the project's end, Charles E. Oakes, PP&L board chairman, and Mark W. Cresap, president of Westinghouse, said:

"We continue to believe that this reactor holds bright promise for the future, involving as it does potentiality of conversion of thorium to fissionable material. However . . . the present facts indicate the necessity of further research and development work, including prototype development and experience, before a large-scale plant would seem to be warranted."

Early last year, PP&L and Westinghouse had asked AEC for funds for further research. After general Congressional approval, contract negotiations were commenced with AEC. The negotiations, however, had not yet been concluded at the date of the companies' decision to suspend the project.

"We didn't see how we could negotiate the AEC contract without laying the facts on the table," said Jack K. Busby, PP&L president. "Cutting off the project was not a popular thing to do, but it was the only sensible conclusion we could reach. The technical staffs of PP&L and Westinghouse found that a full-scale plant would not be feasible at this time, and we felt that we could not properly negotiate a contract for which the government might pick up the check any more than we could properly continue to spend our own money."

The companies informed AEC that they would make no claim on the federal government for reimbursement of any of their expenditures.

Oakes and Cresap pointed out that an experimental homogeneous program at AEC's own Oak Ridge National Laboratory has encountered delays and difficulties, and noted that this highlights changes that have taken place in "previous conceptions and projections of feasibility and operability."

"This announcement is no condemnation of the homogeneous concept," said Oakes, "but it is, we believe, a realistic appraisal of the present situation . . . Certainly PP&L's newly-announced participation in the gas-cooled reactor power plant to be built by Philadelphia Electric will not continue to be the extent of our nuclear power effort. For, in our company's philosophy, the sound and orderly development of nuclear power is plain, common sense."

WWP Sees Bright Future in the 'Electric'

An experimental electric car developed by Washington Water Power Co provides another convincing bit of evidence that the "electric" is more than a museum piece. A converted Crosley sedan, the experimental model was built by Robert Sewell, a WWP engineer. Conventional storage batteries and one motor drive it at speeds up to 30 mph.

"Tests now show," said George Brunzell, executive vp, "that with two motors, a rear wheel direct drive, and specially designed batteries, speeds of almost 60 mph and a much longer operating time or driving range are possible." Above, (l to r) are Brunzell, Pres Kinsey Robinson, and Sewell.

Mexico Gears for Record Breaking

Public-vs-private differences shelved because of 'frightening demand.' New facilities will cost $1.5-billion in next decade

PETER WEAVER, Chief, McGraw-Hill's Mexico City News Bureau

Mexican power companies, both government and private, are gearing for the biggest power expansion program in the country's history. In the next eight to ten years, around $1.5-billion will be spent on new hydro, steam, and other utility facilities.

The reason is simple. Mexico's expanding economy (GNP is averaging a 7% yearly increase) is pushing an industrial boom to keep up with a 3.5% per year population increase.

To stay ahead in the power race, the government, while pushing its own generating organization, does not discourage the two big private electric companies. It is true that there is some nationalistic feeling against the companies—because they are foreign owned.

But, because of the "frightening demand" for electricity in the next ten years, these differences have been pretty well shelved. As one government official put it:

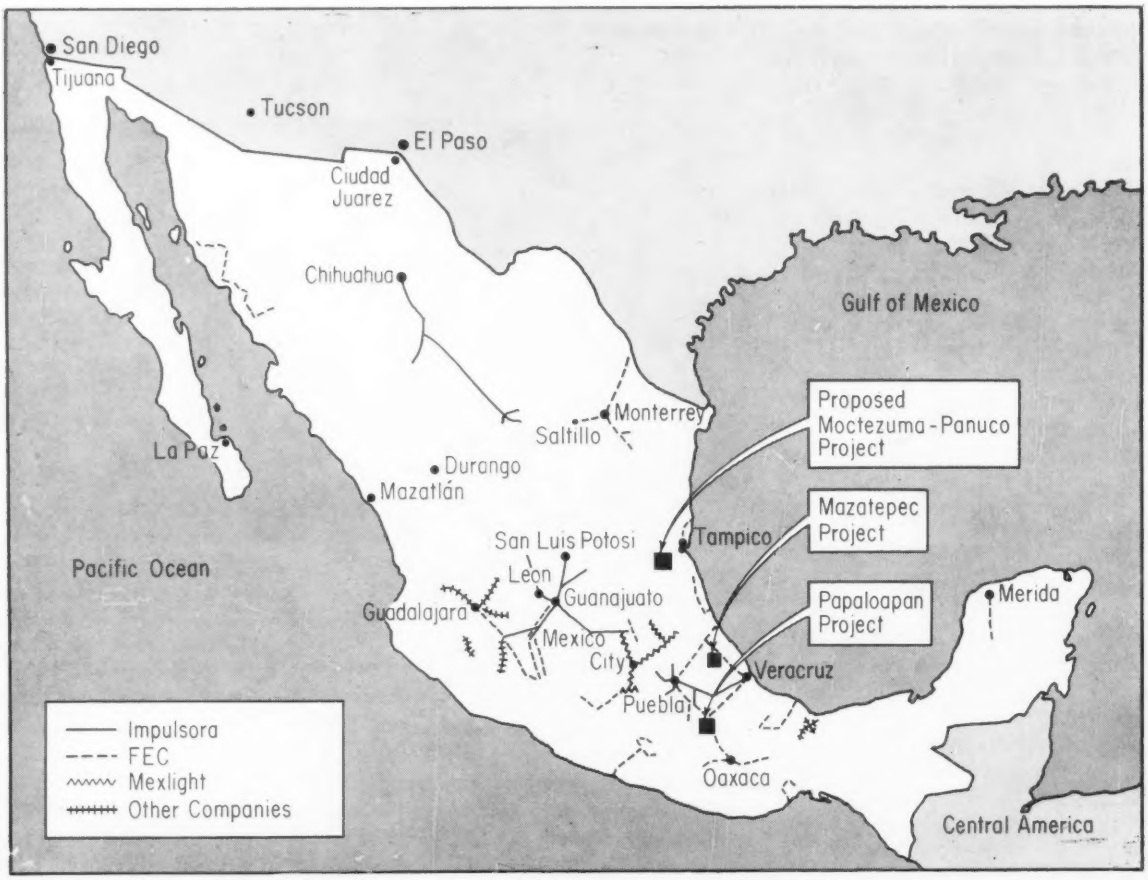
"There is a lot less shouting and fighting going on here about private and government power rights than there is in the U. S. We have too much to do, no time to waste."

The Economic Commission of the U. N. maintains that, in the next eight years, Mexico will have to up generating capacity at least 185%. In the next ten-year period, Mexico should have 5 to 6-million kw installed capacity. Right now, there is around 2.5-million kw.

The combination of one big government power organization—called Comision Federal de Electricidad (Fed Electric Commission or FEC)—and two-foreign power companies, so far, have been able to stay at least neck and neck with industrial growth.

Mexican Light & Power Co. Ltd (40% owned by Belgian Sofina), the bigger of the two companies, serves the metropolitan area that makes up Greater Mexico City (nearly 6 million pop.). The other is American & Foreign Power Co's "Impulsora" (Cia. Impulsora de Empresas Electricas, S. A.).

There are a few other small pri-



MAIN TRANSMISSION LINES of 'Big Three' are reaching farther out to about 16 million people lacking electricity

Power Program

vate power companies, but 95% of the power sold to the public in Mexico is generated and distributed by the "Big Three." Some 20% of the country's capacity is now in private hands. These are mostly standby plants that industries built up in days of power shortages.

The Big Three recently outlined plans for the next ten years:

- FEC says it will have to spend some 7-billion pesos ($550-million) in the next ten years.
- Mexlight estimates it will probably spend some $300 million.
- Impulsora says it is rolling on an already approved program that calls for around $200 million.

I. Fed. in Business

The Mexico federal government has been generating power since 1938, the epoch of Gen. Lazaro Cardenas' regime as the president who expropriated the foreign oil companies. It was a heyday for nationalism and government ownership. But at the time the government had only one 64-kw plant.

In 1949, the Federal Electric Commission actually came into being with a special decree, creating the FEC as a "decentralized, public organization with legal personality and its own patrimony."

By this time, the government had bought up or built plants with a total of 138,430-kw installed capacity. Since 1949, FEC has become one of the biggest single generating organizations in Latin America, with current installed capacity near 1-million kw.

FEC's current expansion program includes nine projects under way or nearing completion, and ten projects in earlier stages of construction. Among the big jobs nearing completion are three hydro dams. The biggest, on the Apulco River, is the "Mazatepec Project" which will have 200-Mw capacity.

Another big project which should be finished by next summer is "Temaxcal" in the big Papaloapan System, encompassing Oaxaca and Vera Cruz states in Mexico's southlands. Mexicans call Papaloapan their "TVA." Initial capacity will be 115 Mw.

All told, FEC has 759,780 kw under way, including some thermal, which when completed, could make FEC the biggest producer in Latin America.

Apparently, the government felt a federal organization was necessary to push power projects into undeveloped areas that private companies considered uneconomical. There has been talk in Mexico City business circles that FEC has also gone into areas well within reach of private companies.

Because the government did not want to grant new water rights to private power, FEC has gone heavily into hydro and steam stations to keep up the necessary balance in water and thermal energy. Balance is now 53% thermal, 47% water.

FEC does little distribution and sells almost all hydro power to Mexlight and Impulsora. Mexlight is interconnected with FEC's 350-Mw Miguel Aleman System and Impulsora will be interconnected with Temaxcal Dam and the Papaloapan System.

Heading FEC's fast-expanding network is Carlos Ramirez Ulloa, who says the future for private power companies, as well as for his own government organization in Mexico, is assured. "There is more work than all of us can handle." One big problem in the future will be financing, he says, explaining that "Mexico will need plenty of financing from all directions—for both private and public works."

With earth-moving just starting for a new 200-Mw hydro project near Mazatepec and a new 230-kv tie line to Mexico City, heavy financing for foreign equipment imports will be urgently needed. For all of Mexico, some $450-million dollars worth of imported equipment will be needed by her electric industry in the next eight to ten-year period.

"During the next ten years, Mexico will have one of the highest rates of expansion for power generation in the world," Ramirez Ulloa said, adding that the next big moves might come in Mexico's wealthy, but sparsely inhabited, Southeast where there are oilfields, some of the biggest natural gas fields in the world, sulphur domes, newly-found salt domes, lumber and—more important to FEC—enormous water potential.

FIRST 230-KV line ties in FEC hydro. Mazatepec-Mexico City link is planned

MEXICO's 'TVA' is the FEC Papaloapan System project. Output will be 115 Mw

II. Mexlight

Mexlight, the biggest private company, cannot afford the "luxury" of viewing far and fertile fields such as the Southeast because it has one giant to feed right in Mexico's heart—the rambling, booming Mexico City area.

Mexlight's problem is to keep ahead of this area's appetite for electricity. Earlier this year, the company just squeezed a third 82.4-Mw unit into its Lecheria Steam Plant in time to avoid a shortage caused by drought one year, floods the next in the nearby hydro reservoir region.

Mexlight engineers give a graphic

example of their problem. Early this year during a drought, the company generated 6-million kwhr a day with thermal stations. Now, after floods, thermal output is 1-million kwhr/day (total daily kwhr generation is around 11 million).

Because of the growth of the city and its surroundings, the lack of enough lead-time for big hydro projects, the cheapness of petroleum fuels (half the U. S. price), and, because of the government's hitherto reticence to grant new water rights, Mexlight has been sticking to construction of thermal plants like Lecheria.

With the new unit just in at Lecheria, plant capacity is 148.4 Mw. By 1960, a fourth unit will be in bringing total capacity to 230.8 Mw. It will be the biggest generating plant in Mexico, costing some $30 million.

Airlift Averts Shortage

To avert a shortage this year, Mexlight flew 45 tons of parts for a generator unit from Germany by chartered planes to be able to put the third unit on the line at Lecheria three months ahead of schedule.

For the future, Mexlight plans two new steam plants of 200 to 300 Mw to keep up with the city's needs in the early 1960s. But the company also has "in the drawer" a plan to harness the Moctezuma and Panuco rivers, northeast of Mexico City.

The government to date has not granted any new river rights to private companies. Mexlight officials hope, though, their hydro irrigation, and flood-control project for the Moctezuma-Panuco Basin, which flows into Tampico, might tempt the government to give the go-ahead.

Mexlight calculates that 1,000 Mw could be gleaned from the basin.

Besides its good credit rating with world lending organizations, Mexlight has recently tapped a new financing font—U. S. insurance companies. A few months ago, the company sold $4.5 million worth of 6% first mortgage and collateral trust bonds to seven U. S. life insurance firms. Mexlight officials maintain this is the first time any of these firms had purchased any big chunk of securities outside the U. S. or Canada.

Rate Increases to Help

A recent adjustment will give Mexlight an average increase of 8½%, effective February 1. This will help in its expanded search for financing in the securities field. The increase also will about cover a $2.6-million annual wage hike given 9,500 employees last April.

Mexlight's president, "General" William H. Draper, Jr, has the theory that you have to plan your electric programs, try to get some assurance about better rates, and then worry about actually getting the rates in hand later.

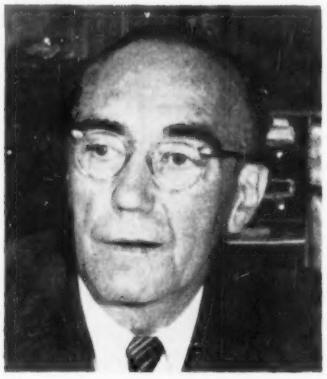
So far, Mexlight has invested $90 million in Mexico since 1950 compared with $107 million from the company's inception in 1902 to 1950. The really big push of this decade could more than triple in the next ten years, according to company financial officers.

One of Mexlight's big problems is public relations. With a city of 5 million to serve in the center of the country's political eye, Mexlight finds that it is often the target for slams from over-zealous nationalists and disgruntled customers. "They call the general or one of us at our homes in the middle of the night," a company PR officer said.

There are some 650,000 customers in Mexlight's Greater Mexico City district served by the company's present installed capacity of 578,745 kw plus the 351,575 kw Mexlight buys from FEC's Miguel Aleman System. When both FEC and Mexlight have completed current expansion programs in 1960, Mexlight will have some 1,200 Mw on hand.

Currently, 85% of Mexlight's output goes to heavy and light industry, only 15% to residential areas. To keep up with this industrial boom—steel, chemicals, manufacturing—Mexlight has been buying more FEC power (10% in 1950, 35% now). Whether this trend continues depends on how President Lopez Mateos' government treats the granting of water rights and the wage-increase rate-hike spiral.

CARLOS RAMIREZ ULLOA



W. H. 'GENERAL' DRAPER, JR

DAVID H. MATSON

PUEBLA SURVEY led to Impulsora fair that brought gain in appliance sales

III. Impulsora

The transmission network map of Mexico substantiates that Impulsora, the American & Foreign Power subsidiary, was "born and raised in the interior," as one company official put it. Unlike its col-

(*Continued on page* 68)

How 22 Manufacturers View 1959

Conviction that a sound recovery is under way is reflected in the cautiously optimistic tone of year-end forecasts by electrical manufacturing executives. Almost unanimously they concede that the drop in capital business has leveled. But they look for scant improvement in capital goods business until late this year. Then they foresee a pick-up leading into a strong surge of expansion in the 1960 and 1961.

A level of utility and industrial business somewhat under the record pace of 1957, but marginally ahead of 1958 is forecast.

Most electrical manufacturers are going into 1959 with a reduced backlog of utility and industrial orders and look to the stepped-up pace of consumer, defense and construction expenditures to compensate. However, heavy apparatus manufacturers warn that unless utilities place orders for generating equipment early this year they face possible delays in deliveries in the 1960s.

These are the highlights of an informal year-end roundup of forecasts by Electrical World, from which the following quotes are taken.

Allis-Chalmers Manufacturing Co

"Steady improvement is seen in 1959 business.

"Sales for Allis-Chalmers for 1958 will probably be a little below those of 1957, although the profit margin should be better.

"Modernization and expansion moves contemplated within the power industry during 1959 and the immediate years ahead indicate a steady increase in generating equipment bookings can be expected. While our shipments and large unit construction reached an all-time high for generating equipment in 1958, backlog lagged slightly from 1957.

"Transmission and distribution equipment need is expected to follow the same pattern. As modernization and expansion of basic facilities take hold in 1959, transmission equipment must be added or replaced. With a brightened home and industrial construction picture ahead, transmission and distribution equipment will be required to meet a rise in power demands.

"Construction machinery sales, which hit a low in 1957, continued this trend in early 1958. However, in the last quarter of 1958, the effects of the new highway program on the construction machinery business became evident. Present business indicators lead us to believe that the gross national product in the U. S. will continue its current upward trend . . . We feel that in 1959 farm equipment, power, and industrial sales should be good, and construction and construction machinery sales should continue to improve."

Executive Officers

Aluminum Co of America

"The upward trend of aluminum consumption since the 1958 first quarter low will continue in 1959. Shipments by Alcoa to customers next year will exceed 1958 totals by better than 10%. Significant gains for

(*Continued on next page*)

National Electrical Manufacturers Association

"The electrical manufacturing industry, looking confidently ahead to future business conditions, expects to produce $21 billion worth of goods in 1959—a volume almost as high as the peak years of 1956 and 1957.

"The optimistic prediction for 1959 contrasts with reports of sales in 1958 when the recession brought down the hopes for a good year to $19.5 billion—a drop of 10% over the $21.6 billion volume recorded in 1957.

"Despite generally disappointing sales in 1958, all segments of the industry see better days ahead. With spending for new construction expected to rise in 1959 by 7% over 1958 levels, manufacturers of illuminating and building equipment see corresponding increases in their business in the offing—a 6% gain for illuminating equipment, and 8% for building equipment. Shipments of signalling and communication equipment are expected to rise 1% in 1959 over 1958 when the industry matched its 1957 peak in dollar volume of $1.3 billion.

"While the industrial apparatus group suffered a setback because of the curtailment of expenditures for new plant and equipment, it too sees improved times ahead, forecasting an increase in volume of 7% in 1959. This gain would mean 1959 business for this group of $2.9 billion. Sales in this category in 1958 were $2.7 billion, a drop of 13% from $3.15 billion in 1957.

"Shipments of generation, transmission, and distribution equipment is due for a slight rise, with manufacturers forecasting a modest 2% gain in dollar volume in 1959 over 1958, when total sales amounted to about $2 billion. Shipments of these items in 1957 amounted to $2.4 billion.

"The wire and cable industry, which sees an 8% gain in its volume of business for 1959 over 1958, reported a low of $1.3 billion in sales in 1958. This is considerably below levels in other years, particularly the peak year of 1956 when dollar volume reached $1.8 billion.

"Electric appliance sales, including major appliances and housewares, will be up 7% in 1959 over 1958, according to manufacturers' estimates. Leading this anticipated rise will be built-in ranges, food waste disposers and automatic dishwashers.

"Another group of electrical products . . . such as radio and television tubes, electronic components, automatic temperature controls, commercial air conditioning and refrigeration equipment, and commercial radio equipment . . . are expected to hit $7.1 billion—a 9% gain over 1958."

Joseph F. Miller, Managing Director

aluminum are expected during 1959. Aluminum made important inroads in the electrical field during 1958 . . . Growing numbers of manufacturers of electromagnetic devices also began using aluminum strip windings for transformers and miscellaneous electrical equipment. Alcoa's 1958 research and development budget was 14% higher than actual expenditures in 1957, as the company accelerated its efforts to stimulate new and broader applications for aluminum in all market areas." *Frank L. Magee, President*

Anderson Electric Corp

"We look to 1959 as being a growth year for the electrical industry. Competition will be keen, necessitating aggressiveness on the part of all manufacturers to meet the opportunity and challenge that the new year offers." *Thomas H. Fox, President*

Babcock & Wilcox

"The year 1958 saw a low level of sales activity for manufacturers of utility equipment. We expect 1959 will be somewhat better if utilities start building up for the projected increased demands of the years ahead. In fact, if utilities do not start building up and ordering ahead, they will find manufacturers without the capacity to handle the rush of orders which otherwise will develop at the last minute." *M. Nielsen, President*

Jasper Blackburn Corp

"Connector inventories in normal distribution channels are holding slightly less than normal. Volume in 1959 should increase 4-5% over 1958 levels. Profits will continue a downward trend as manufacturers absorb a fourth wage increase without increase in selling price." *Ken Way, Vice President*

A. B. Chance Co

"We're optimistic about business prospects in 1959. . . . We expect to benefit from the apparent upturn in construction. Making Porcelain Products, Inc (High-Voltage Div) a part of A. B. Chance Co and directing insulator sales from our regional sales offices should give better service and result in some increases, too. Several new product contributions will also be helpful. Generally, we expect a 15% sales increase with a net profit percentage comparable to last year."
F. Gano Chance, President

Federal Pacific Electric Co

"A sales increase of 20-25% is expected from introduction of many new products and materially stepped-up marketing effort in a good business climate."
Frank H. Roby, Executive Vice President

General Electric Co

The business recovery underway since the third quarter is sound and will continue. The stronger segments of the electrical business in 1959 will be consumer goods, defense, and public construction including schools and highways, water and sewage systems and other community facilities. Higher levels in these areas are expected to compensate for the lower backlogs of utility and industrial orders.

GE expects a lower level of sales to utilities in the early months of 1959 than the trend in the peak year of 1957. Electric utilities in 1958 installed a record amount of new generating capacity but this capacity has only kept pace with load growth in most utilities. The overall utility industry picture this year has been distorted by lower power sales in major industrial centers most deeply affected by the recession. Utilities have also experienced two cool summers with high rainfall rates. This has cut comfort cooling and irrigation pumping load.

If we have a hot dry summer as well as the expected improvement in economic conditions, many utilities will find reserves are not as large as they seem. Moreover, utilities will need more capacity in the early 1960's, so their orders for equipment with a long manufacturing cycle cannot be indefinitely postponed.

There are reports of soft prices in utility equipment, but it seems a spotty phenomenon. Utilities realize that to squeeze legitimate costs of research and future progress out of equipment prices in order to take advantage of a temporary situation simply means higher costs and lower efficiency for them in the future. Prices will continue to be competitive but will not collapse and demoralize the market. This is something the customers will decide, not the manufacturers.

As for electrical equipment for industry, it is expected that orders will increase slowly in 1959 followed by a strong surge in 1960 and 1961. Most of the orders this year will be for modernization and replacement, rather than expansion. Efficient production facilities have become a major factor in industrial competition.

This in brief is the evaluation of the business outlook for 1959 advanced at a year-end conference by . . .
Ralph J. Cordiner, Chairman of the Board

Kaiser Aluminum & Chemical Corp

"We look for usage of aluminum conductor to increase almost 10% in 1959 over the past year. While sales of transmission cable will probably be slightly lower, distribution wire and cable purchases by utilities should rise. The big increase—at least 50% over 1958—will occur in use of insulated aluminum conductor products."
J. T. Dugall, Gen Mgr, Electrical Conductor Div

Kuhlman Electric Co

"We expect a good year in 1959. Our sales volume should be about 20% better than 1958 and will be comparable to 1956 in volume, which was the highest in our history. Most every economic yardstick supports our viewpoint that business in general in 1959 will be much better than in 1958."
H. E. Greenwalt, Executive Vice President

Lapp Insulator Co, Inc

"We expect 1959 to be a year quite similar to 1958. It probably will fall considerably short of the peak year, 1957. On the other hand, we do not expect business to fall apart completely as many feared for 1958. If the power companies can continue a moderate construction program through years of low load growth, and avoid peaks of the boom years, everyone will be better served." *Brent Mills, Executive Vice President*

(*Continued on page* 44)

Armless Poles Carry 69-Kv Line

New AEP construction saves up to third of structure cost, allows longer transmission spans, cuts radio noise level

R. L. RETALLACK, Engineer, Electrical Engineering Division, American Electric Power Service Corp, New York, N. Y.

Armless structures on new 69-kv transmission lines of American Electric Power System companies feature simple design and construction, lower radio noise levels, longer spans, and lower cost than the conventional single-pole 69-kv suspension type.

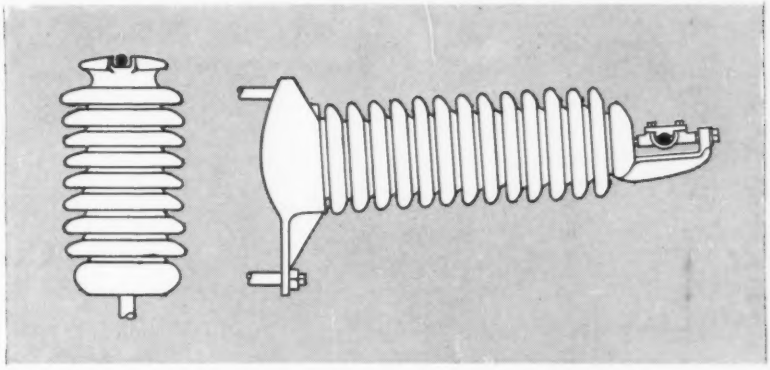
On a per-mile basis, the new construction saves as much as a third of the total structure cost, and installed cost per structure is about 8% less. The major saving, however, derives from the fewer structures per mile, the result of longer spans. Overall savings come to about 15% of the total installed cost after outlays for conductors and right-of-way clearing are included.

When land rights are negotiated on a per-pole rather than an acreage basis, the longer spans afford more economies. Total net savings are then about 17%. All these percentages, of course, pertain only to line sections with armless construction throughout. Angle and deadend structures, common to both designs, raise the total cost of either design equally and correspondingly cut the percent savings.

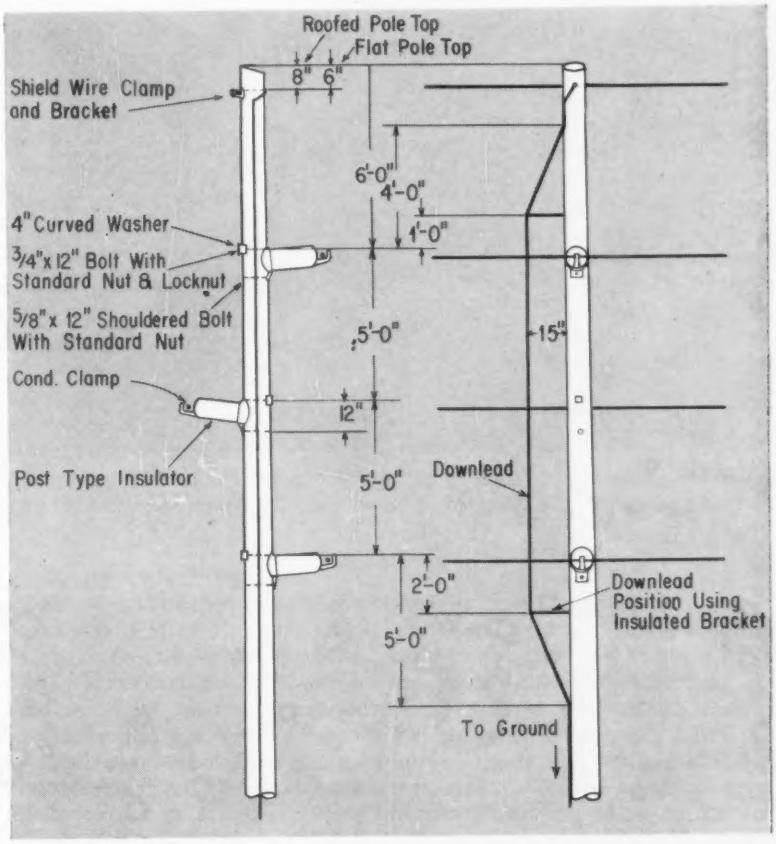
Armless construction takes wire sizes 1/0 ACSR through 4/0 ACSR but plans envision sizes through 336,400-cm ACSR. Span lengths are limited to 500 ft arbitrarily, not by structural strength but to maintain smaller sags which reduce the likelihood of conductor contacts in wind gust or during galloping. The corresponding span length prescribed for suspension structures is 350 ft.

The first line of armless construction on the AEP system was built by Ohio Power Co in 1955. Today this company, together with Indiana & Michigan Electric Co, has 68 line miles built and 38 miles planned. Of this 106 miles, 41 are at 69 kv, 43 are at 34.5 kv, and 22 at 23 kv. The 23 and 34.5-kv lines under construction are for future conversion to 69 kv.

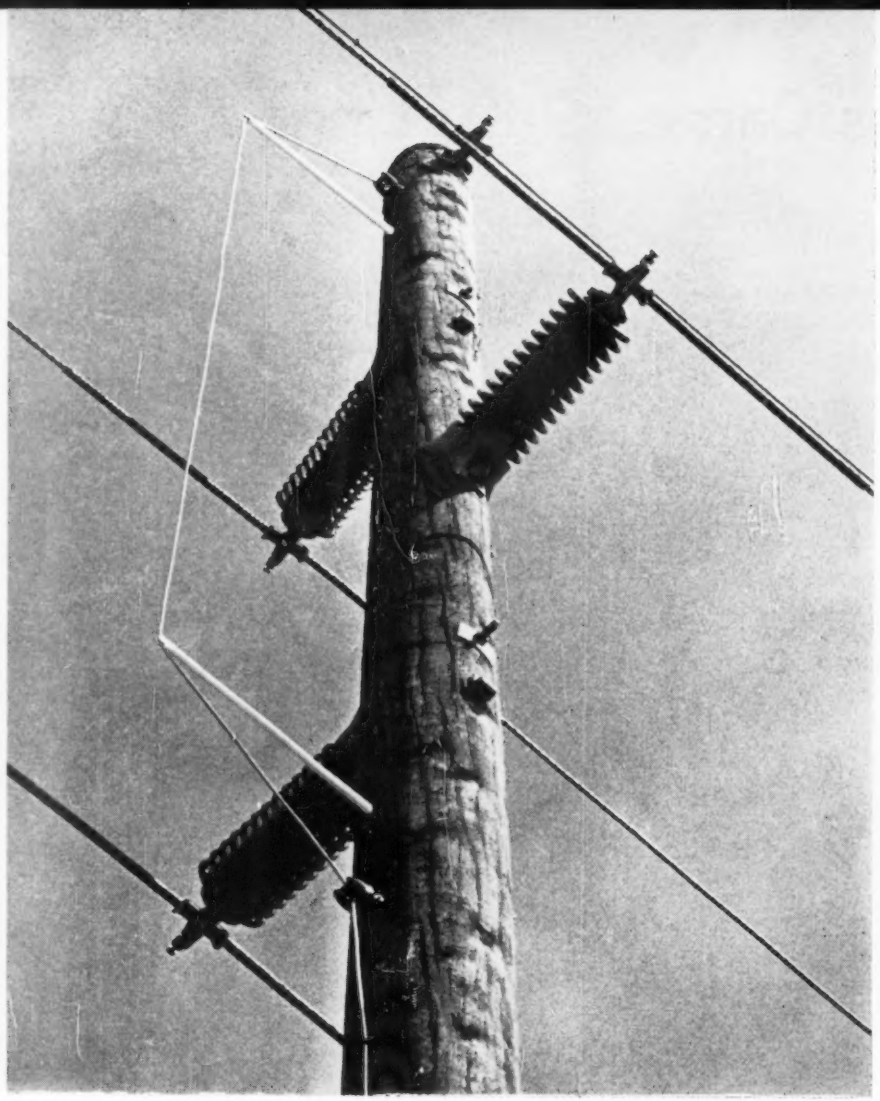
The impulse insulation level for the 69-kv armless structure is 425 kv, as fixed by the air-gap distance to the offset ground wire downlead. This level is somewhat less than for five suspension units, the standard for AEP transmission structures



POST-TYPE INSULATOR for armless-pole installation (right) was developed from vertical type (left) to horizontal type with integral base and clamp top



AEP DRAWING shows the offset downlead to ground as now used on 69-kv lines. The rods supporting the downlead are merely inserted in holes made in pole



DOWNLEAD from shield wire (in perspective almost concealed by conductor in No. 2 position) is supported 15 in. from pole surface by two plastic struts

for many years. Operating performance of the armless construction however has been comparable to that of AEP 69-kv suspension construction.

Radio noise levels are as low initially as those on new suspension-type construction and are expected to remain so. Suspension structures may experience rising levels with age as components loosen or corrode and then generate noise.

Development of armless construction began with removal of the arms from a structure carrying vertical post-type insulators. The insulators were then mounted horizontally on the pole itself. AEP's first line used tie-groove insulators. The side tie, usually employed with vertical post or pin-type insulators at line angles, was used to hold the conductor.

As armless construction was evidently adaptable to longer spans, a more suitable conductor clamping device was sought. Many good features of the standard clamp top for the vertical post-type insulator could be retained. This was done, a clamp top being developed for supporting the standard clamp in the normal position with the trunion axis essentially horizontal. The clamp assembly proved quite satisfactory in tests and service. A similar assembly, mounting directly on the pole, holds the ground wire.

Subsequently, in service, the conventional mounting method proved inadequate to support the insulators in a horizontal position. The conductor's vertical load deflected the insulator's outer end slightly downward as pole fibers were compressed under the mounting bolt washer and the pole gain plate. Pole shrinkage in dry weather contributed to this tendency, since slack in the mounting bolt was taken up by further drooping.

A mount was developed that reduces pole-fiber compression and the effect of pole shrinkage. It was cast from a curved section to fit the largest pole diameter anticipated. This casting was made an integral part of the insulator unit.

But the curved section on new poles posed a new problem. Longitudinal movement of the unit could occur from differences in conductor tensions between spans. Such movement could damage bolt, pole, and conductor. To assure a tight fit on poles of any anticipated diameter, the base was modified to make three-point—really three-area—contact with the pole surface. This base adjusts to various pole shapes and diameters.

Rated for 2,800 Lb

Rated strength of the post-type insulator is 2,800 lb for cantilever loading. Porcelain components are tensile loaded continuously, a condition not heretofore experienced on the AEP system. As the horizontal insulator must carry cantilever loads continuously, a greater margin of safety was desirable in the design. It was provided on the basis of an ice load of ¾ in. in the heavy-loading district and ½-in. in the medium-loading district, with a safety factor of 2.0. With this loading, wire sizes through 336,400 cm ACSR can be used for spans up to 500 ft.

A more severe condition for transverse loading than is prescribed in the National Code for the range of AEP conductor sizes was employed. In the heavy-loading district a condition of 12-lb wind on bare cable was investigated. For the medium-loading district, the wind was 10.5 lb. Class 4 poles, with a safety factor of 2.0, withstand such loads on spans up to 500 ft.

Angles as wide as 5 deg in line have been turned on these structures. All three insulators on the side away from the guys adapt armless construction to small angles in line. Adjacent spans are then

shortened to offset the smaller phase-to-phase clearance. This arrangement resembles the standard running corner suspension structure. For wider angles and dead-ends the standard structures, as normally used with the suspension structures, were employed.

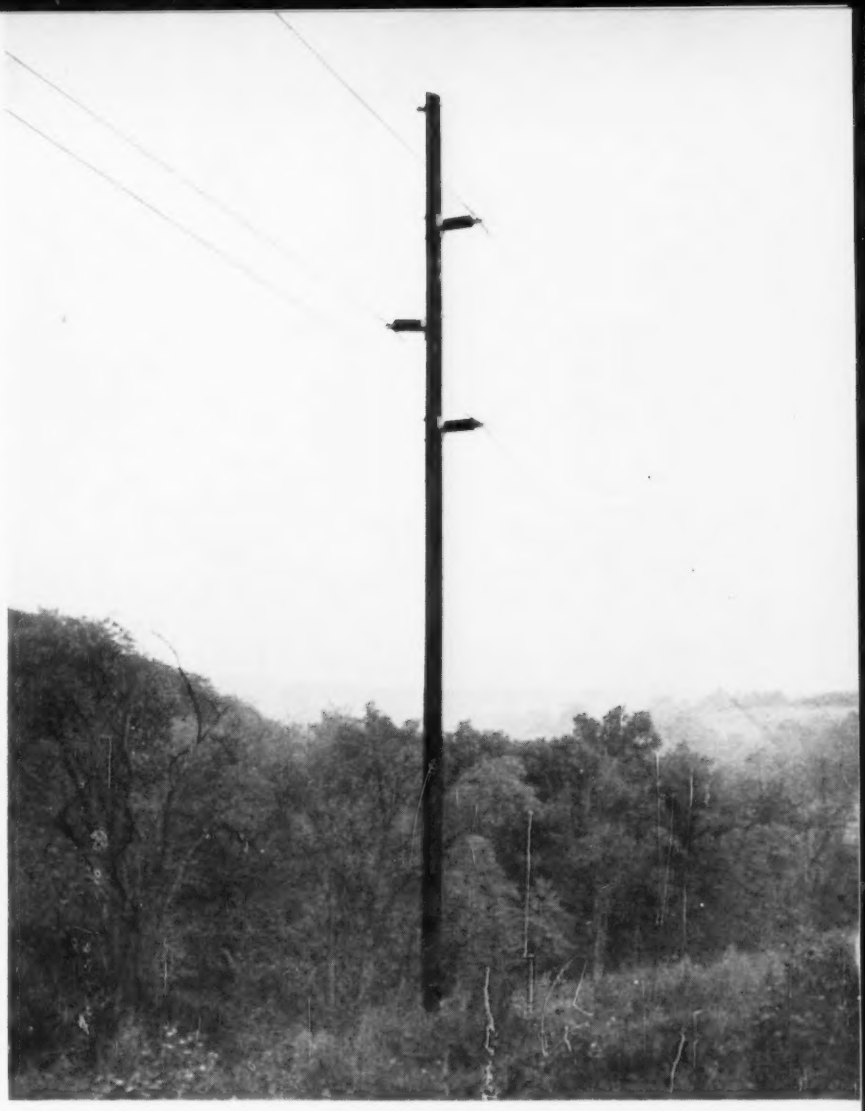
Phase Clearance 5 Ft

Phase clearances are 5 ft vertically and at least 4 ft 2 in. horizontally. Studies of conductor behavior under wind gust and galloping indicated a limiting span length of 500 ft for these clearances. For the suspension structure with a straight vertical clearance of 6 ft, a limiting span length of 350 ft had been determined.

Simplicity of construction is apparent. The armless structure was assembled completely on the ground before erection, and erection and wire stringing proceeded very much as with suspension construction. Wire stringing blocks were suspended from the clamp end of the insulators. Hot-line maintenance is no more complicated than on structures with arms, as energized conductors are usually propped out from the pole on hot sticks during work on insulators.

The 69-kv insulation, standard on the AEP system for years, has been five 5-by-10-in. dia suspension units. This insulation gives an impulse level, when the string is vertical, of 490 kv and correspondingly lesser values for sideswing conditions. As the insulation of the post-type insulator remains fixed under sideswing conditions, a reduction from the 490-kv level was accepted. For the 69-kv armless structure, it is 425 kv, as fixed by the air-gap distance between the conductor and ground wire downlead.

As the porcelain insulation alone cannot withstand the full impulse level, the downlead was offset from the pole to put 4 ft of pole wood in series with the porcelain, thus establishing a combined impulse level exceeding the 425-kv air-gap value. This confines impulse flashovers to those through the air between the downlead and a conductor, rather than through the pole, avoiding the possibility of pole rupture. The ground wire shielding angle is considerably less than that on suspension structures, an arrangement that obviously reduces the number of conductor hits.



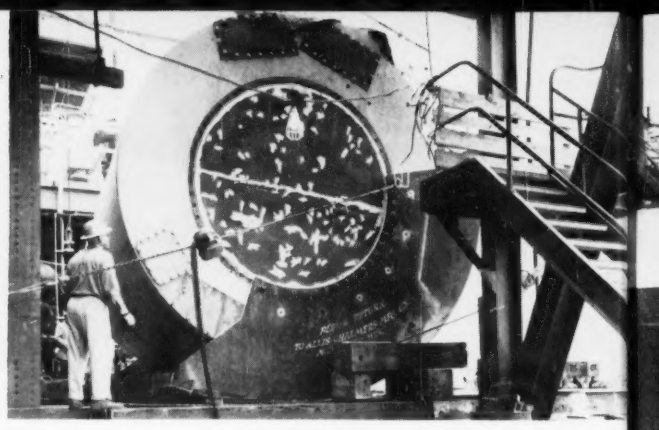
SPANS are as long as 500 ft on new armless pole lines used by AEP companies. The longer spans, affording definite economies, are an attractive feature

Fiber glass rods offset the downlead. These are of standard manufacture glass fibers with a polyester binder. On later designs, all metal fittings were left off, and the rods are mounted in holes in the pole. They hold the downlead 15 in. from the pole's surface, so that the impulse level of the rod is over and above the insulation contribution of the 4 ft of pole wood. The 15-in. air gap between the downlead and pole surface serves similarly.

As armless construction reduces the horizontal spacing between conductors (about 4.5 compared with 8 ft), some savings in R/W cost may be realized. In urban areas where R/W is frequently under franchise, the lesser conductor spacing may dispense with costly overhang agreements with property owners. On private property any width reduction could effect a saving. The reduced spacing is also an advantage in built-up areas where the line is close to structures or buildings. There it obviates costly special suspension construction. Here, spans being generally short, all three conductors may be mounted on the same side of the pole.

In open country the reduced horizontal spacing has no particular advantage, as it is offset by increased sideswing requirements for the increased span length. Yet here too there may be a saving where fewer overhang easements off the centerline are needed.

1 Stator, unloaded from railroad flatcar, arrives on low-boy at the construction site for Neches Station Unit 8

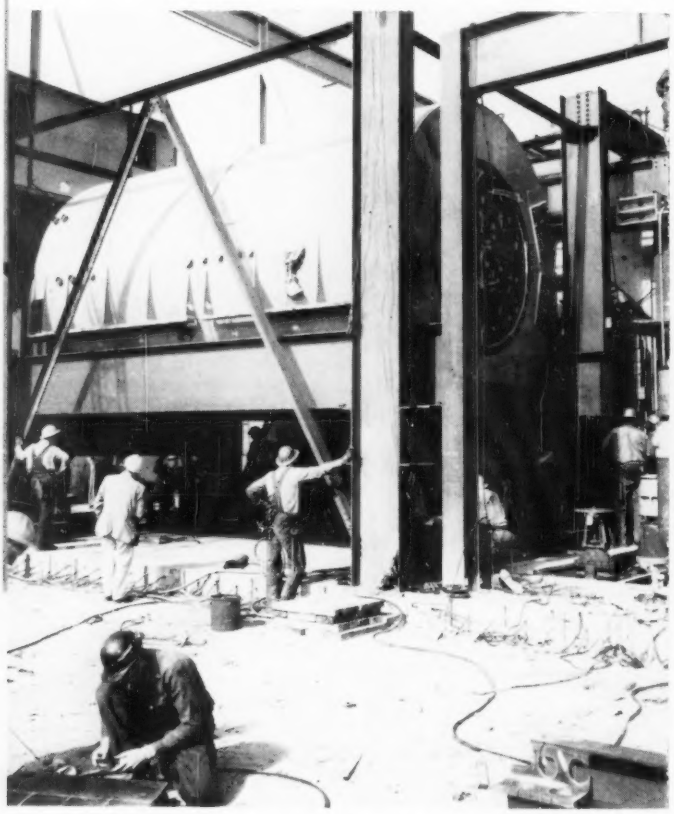


2 Generator is unloaded onto cribbing, skidded to center of jacking structure, and rocker plates installed

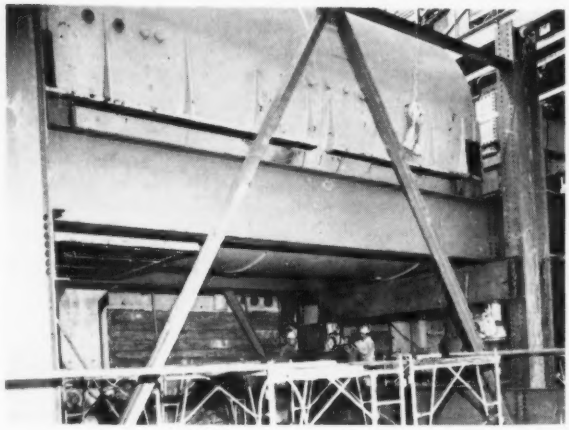
Devise Rig to Lift

R. L. ALLSHOUSE, Project Manager,
V. G. WRIGHT, Asst. Superintendent, Construction,
W. S. COLBY, Structural Engineer, Stone & Webster Engineering Corporation, Boston, Mass.

A custom-designed rig, developed by Stone & Webster Engineering Corp engineers for lifting heavy machinery, cuts costs and time on power plant construction



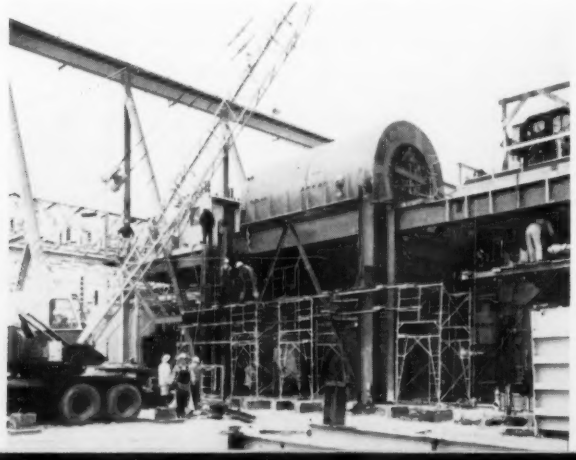
5 Jacks are first removed and then installed again on the stools in preparation for the second upward lift

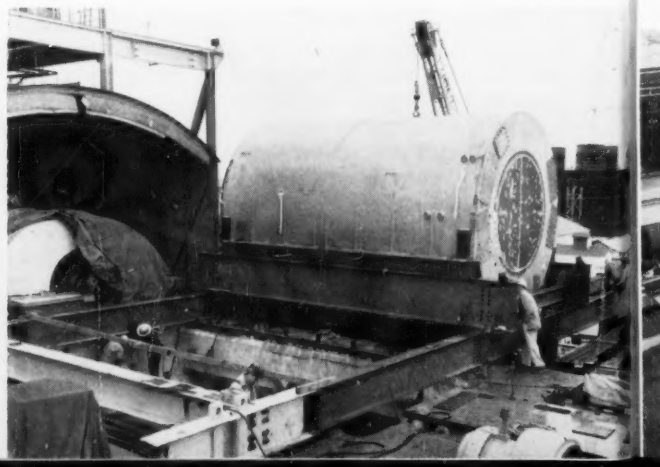


6 Second lift is made, upper beam bolted, lower beam installed and bolted, and jacks reset on lower beam

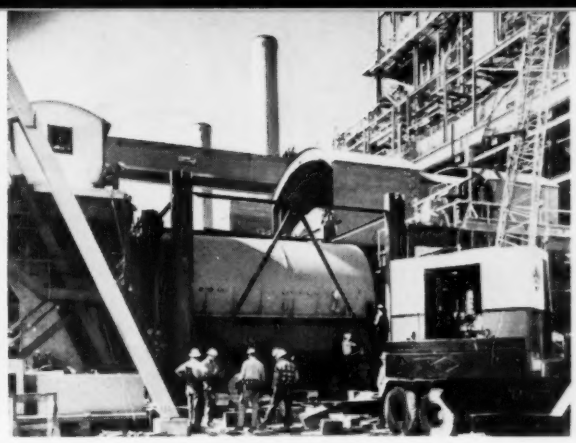
7 Sequence from second to the fourth lift was repeated until generator was raised up to top of the structure

8 Two jacking columns were erected and generator was jacked horizontally to center of the turbine support





3 After being rotated 90 deg, and having rocker plates removed, the generator is lowered into the saddles



4 Jacking structure is erected around generator, jacks installed, first lift made and beams bolted to columns

165-Ton Stator

Construction company saves time and cuts costs in setting generator part at Neches

jobs. Arrangement of the rig for erecting heavy generators is believed to be a unique application.

The movable steel jacking structure for raising up to 275 tons as high as 30 ft was used first at Beaumont, Texas, in building Unit 8 at Gulf States Utilities Co's Neches Power Station.

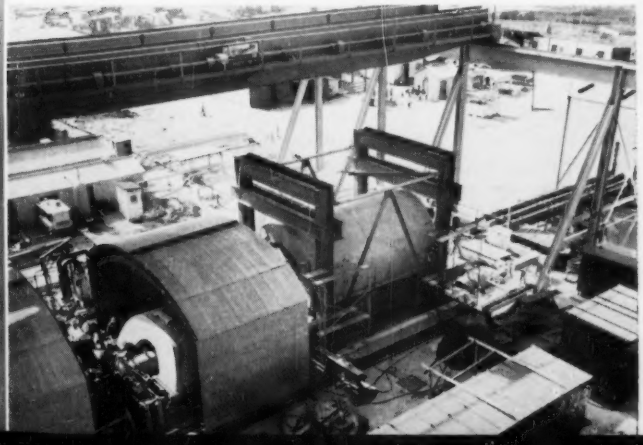
Savings are apparent in a comparison with figures for an identical operation in 1955 in the erection of Neches's Unit 7. Total cost of erecting the 165-ton stator at Unit 8 in 1958 was $14,500. The operation took only 13 working days, but because overtime was involved, working days were reported as 17 in the cost analysis. Erection of the 200-ton stator and rotor assembly of Unit 7 in 1955 took 35 days and cost $18,500. On a per-ton basis, the 1958 erection cost $85.76; the 1955 job, $92.50.

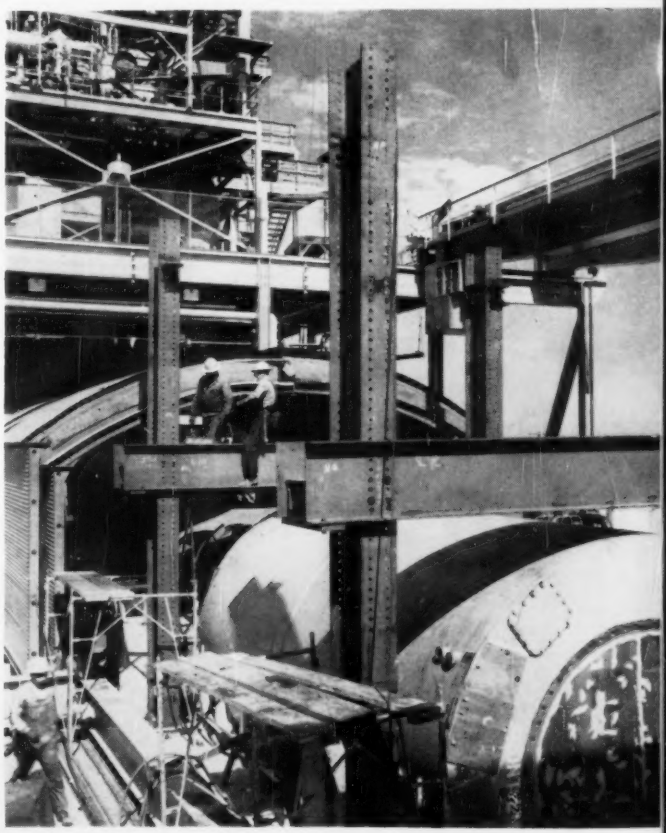
The movable structure has four steel columns supporting the load as well as four 100-ton air motor jacks. The columns are so spaced that a longitudinal beam on either side of the structure supports the equipment under the sole plates. The longitudinal beams are raised on transverse beams under which the jacks are placed.

The load is raised by extending the jacks, operated simultaneously from a control manifold, to the upper limits of the jacks. The cross beams are bolted temporarily to the columns. The jacks are then retracted and raised to the next lift position and are supported in the new location by another pair of transverse beams bolted to the columns at each lifting stage.

After being lifted to the level of the floor where it is to rest, the equipment is skidded over to final location. The jacking structure is used, by reversing the lifting procedure, to lower the generator to its appointed place.

9 Lowering structure was then erected around the generator preparatory to its being placed in final position





10 The upper beam is being bolted, after the two 36-in. beams were removed and the generator itself lowered

Device Phones In

WESLEY C. BAYLIS, Communications Supervisor, Niagara Mohawk Power Corp, Albany, N. Y.

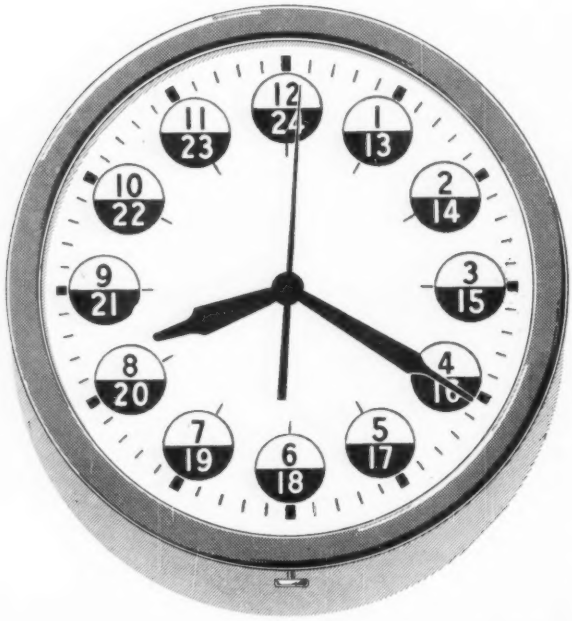
A central office telephone line is used to monitor remote substations by Niagara Mohawk Power Corp. A device known as an Electronic Sentry automatically dials the number at an attended point and gives an oral alarm when trouble occurs at the substation. At other times the circuit is used for normal calls.

The Electronic Sentry consists of an automatic record player, a pre-recorded message on a vinyl record, an electronic relay amplifier and an audio amplifier. It is 10 in. wide x 6 in. high x 12 in. long.

When trouble occurs, the device connects itself across the telephone line and dials the number at the attended point. It then shunts the dialing circuit and connects a talking circuit from the amplifier to the telephone line.

The Sentry repeats the nature of the trouble and its

24-hr Clock System Reduces Errors



GEORGE H. FIEDLER, General Superintendent, Electric and Steam Divisions, Rochester Gas & Electric Co, Rochester, N. Y.

Rochester Gas & Electric Co has recently adopted the practice of reporting records on the basis of the 24 hour clock (midnight is 24:00) used in military operations. Although the principal reason for the change was to facilitate punch card recording, other advantages have also resulted.

The 24-clock system:

1. Eliminates the need for A.M.-P.M. designation and eliminates errors due to misreading of A and P and misunderstanding A.M-P.M. in voice communication.
2. Eliminates confusion surrounding proper designation for 12 noon and 12 midnight.
3. Facilitates the calculation of elapsed time.
4. Reduces possibility of improperly setting chart times.

A few clock dials have been changed to show time on a 24-hr basis, and pressure sensitive facsimile faces have been mounted over existing dials in substations. Some difficulty has been experienced in obtaining 24-hr charts, but continuing efforts are being made.

Operating personnel have generally favored the change.

location to the person answering the dialed number until the trouble is corrected or the Electronic Sentry is shut down. It can be shut down only at its location.

The pre-recorded message is as follows: "This is a special emergency alarm from the Niagara Mohawk Power Corporation's Gloversville Substation," repeated three times. "Will you notify the company supervisory personnel shown in your records." The entire message is then repeated twice.

If the alarm contacts at the substation have opened, the message system will reset to standby awaiting a new alarm closure. If not, it will go through another cycle and continue until the alarm contacts are opened or someone turns off the power input switch on the unit after arrival at the station. The called number at the attended point is an unlisted telephone number to which the public has no access.

The operator at the attended point is instructed to listen to the complete message and then listen to determine if another dialing operation has begun. If no further dialing is heard and the message is not repeated, the operator calls supervisory personnel and reports that an intermittent alarm was received from Gloversville Substation. If the device begins another message, the operator reports a steady alarm.

Additional accessories can be leased from the telephone company to do the following:

1. Record the message automatically on a tape recorder at the attended point with a bell and lamp to signal when an alarm has been received. This will be useful in case the operator is busy when an alarm is being received.

2. Control the relaying interval of repeated tries of the transmitter.

The user can also operate the equipment from a 12-v battery on trickle charge, utilizing an inverter to produce 60 cps, 117 v ac for the Electronic Sentry. This may be useful if a power failure on the regular 117 v ac supply is anticipated.

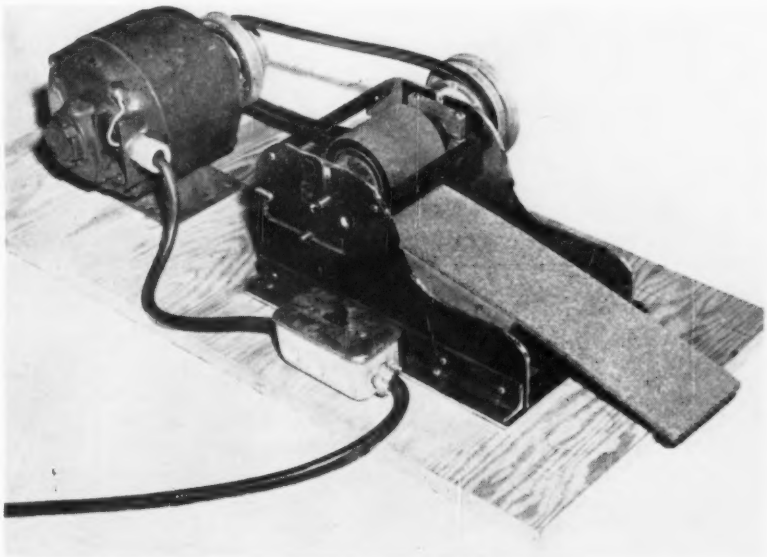
Sander Improves Gasketed Joints

C. B. **ANDERSON**, Supervisor, Salvage Shop, Long Island Lighting Co, Hicksville, N. Y.

A horizontal, belt-driven drum type sander helps produce accurate and tight-sealing gasketed joints for Long Island Lighting Co. Cork and allied synthetics are being used in large quantities for sealing between two metal surfaces or between a metal surface and a porcelain bushing.

The new sander replaces the tedious and expensive process of cutting and shaping the gasket material by hand.

The drum is mounted on a rack consisting of two risers secured to a plate. A movable supporting plate with a fixed angle to the sanding drum is directed in a horizontal pull toward the operator. The distance between the drum and the supporting plate can easily be adjusted according to the thickness of the material to be shaped.



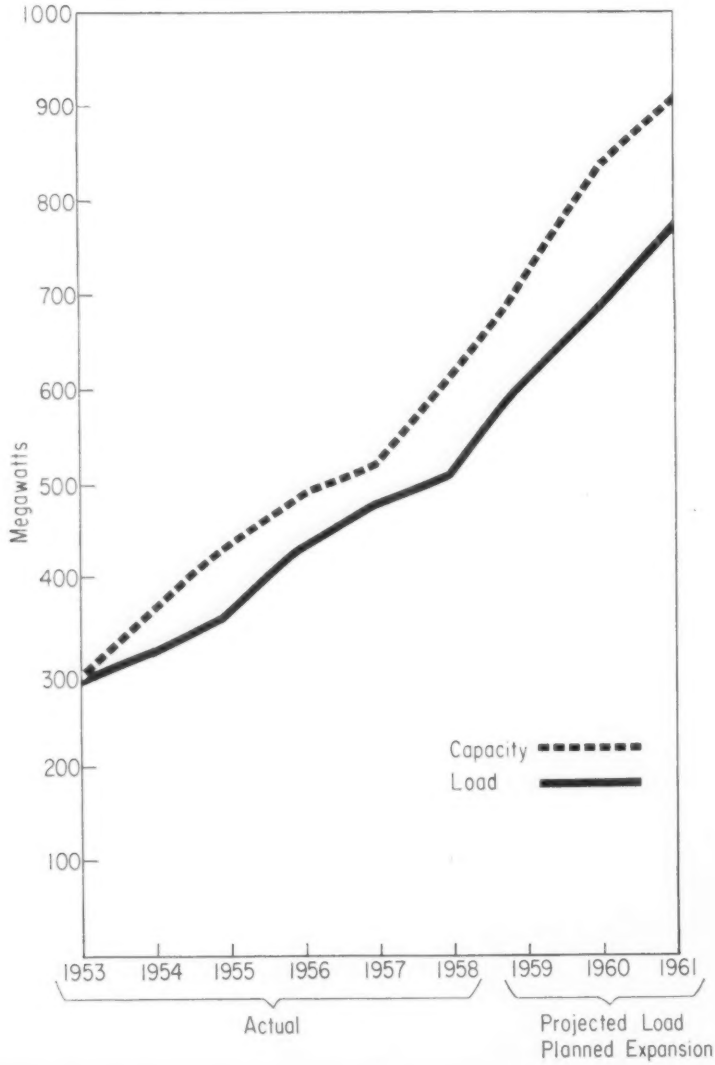
The rack and motor are mounted on one table so that the sander may be used either in a stationary or portable manner, depending on the material location.

Texas Loads Continue Mounting

Air conditioning, new industries push area loads upward; utilities step up expansion to meet anticipated demands

Texas loads continue their rapid growth, and system expansion plans have been stepped up to meet demands anticipated soon.

An analysis of loads and generating capacity for the two groups known as the South Texas System and the North Texas System shows a jump in loads from 2,930 Mw in 1953 to 5,076 Mw in 1958. Projecting the load trend of the past few years, the anticipated load for the area in 1961 is 7,763 Mw. Load growth is running slightly more than 11% per year, 1958 loads being 73.2% above those for 1953. Projected 1961 loads are 165% above 1953 loads. For an eight-year span, a growth of 165% is indeed impressive.



COMBINED LOADS of eight systems rose from 2,930 Mw in 1953 to 5,076 Mw in 1958, and combined systems capacities are also rising rapidly

In the early years of rapid expansion in Texas there was a tendency to feel that the phenomenal growth each year would not be repeated the following year. This, combined with the close capacity situation which developed during the war, resulted at times in a very narrow margin between load and capacity, as may be noted in the 1953 figures when load was 2,930 Mw and capacity 2,969 Mw, leaving a reserve of only 1.35%. It soon became apparent, however, that growth was not a one-year freak condition, and expansion plans were made to meet requirements and provide an improved reserve capacity. Load in 1958 was 5,076 Mw and capacity 6,198 Mw, giving a reserve of 1,122 Mw or 22.1%. If loads follow the projected pattern, the reserve picture in 1961 will be 16.3%.

The charts show that expansion plans call for more than a million kw of capacity per year to go in service in 1959 and 1960. In 1958, 993,000 kw went into operation and 686,000 kw are planned for 1961.

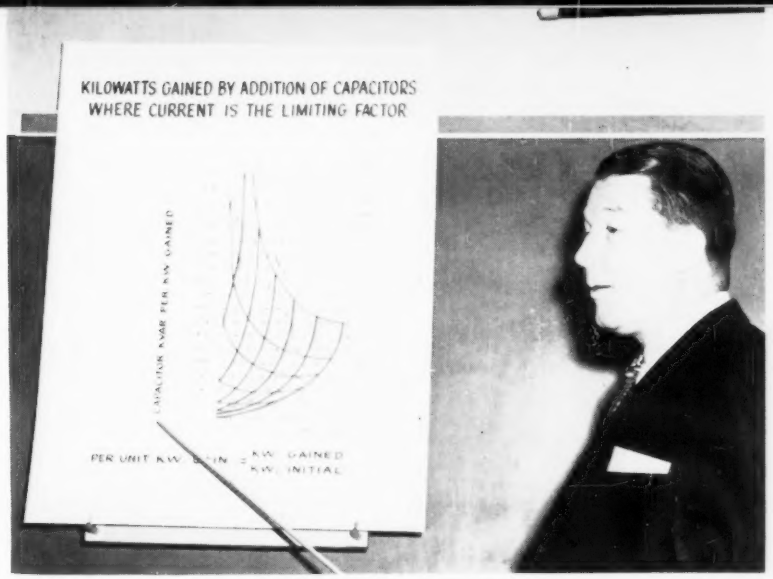
The South Texas System comprizes the systems of: Houston Lighting & Power Co; Central Power & Light Co; City Public Service Board of San Antonio; Austin Water, Light & Power Department; and, the Lower Colorado River Authority. The North Texas System is comprised of: Dallas Power & Light Co; Texas Power & Light Co; and Texas Electric Service Co, all subsidiaries of the Texas Utilities Co.

There are two basic reasons for the increase in power requirements. One is air conditioning, much of which is residential load. The other is industrial growth with its accompanying stimulation loads. Increase in air conditioning load on the Houston L&P system alone was 100,000 kw in 1957.

Chemical, petro-chemical,and related industries are accounting for much of the industrial load growth on the southern system along the Gulf Coast and for some distance inland. The petroleum industry is an important factor throughout the area where the steel and aluminum industries are also expanding.

Discuss Capacitor Applications

Experts in Sangamo talks give why, where, how of primary, secondary installations


KILOWATTS GAINED BY ADDITION OF CAPACITORS
WHERE CURRENT IS THE LIMITING FACTOR
CAPACITOR KVAR PER KW GAINED
PER UNIT KW GAIN = KW GAINED / KW INITIAL

HOW MUCH, when, and where to install capacitors was theme of presentation of R. R. Wylie at the recent Sangamo capacitor seminar for utility engineers

Measurement and control in the application of capacitors to the power system, the place of capacitors in distribution system design, and the pros and cons of primary vs secondary capacitors recently held the attention of 50 specialists at Sangamo Electric Co's first workshop seminar on capacitors at its Springfield, Ill., plant.

Economics of secondary vs primary capacitors probably sparked more lively discussion than any other subject. Harold R. McNutt Jr. said that West Penn Power Co has installed 522 kvar of secondary capacitors. He presented study results to show that secondary capacitors offer enough additional benefits over primary capacitors to justify their installed cost of $18.60 per kvar against $7.50 per kvar installed for primary capacitors.

Space Problem Solved

One problem, he said, was finding space on poles for the secondary capacitors. This was solved by socket type units, mounted on the meter sockets.

Socket-type secondary capacitors, priced slightly higher than those on the pole, cost less to install and solve the space problem, said W. F. Ostermeier, Sangamo.

W. C. Morris, Southwestern Electric Power Co, said that his firm faced the problem of determining when reactive load was on the system and in what magnitude. The problem was solved economically by installing meter sockets in substations so that few socket-type watt-meters, var-meters, and volt meters could be installed and moved by unskilled employees, from substation to substation. Sockets were installed at 8-ft heights on 6-in. channels.

Arizona Public Service Co studies indicated that installation of capacitors is economically justified to correct power factor up to 98.5%, said R. E. Reinbold. Primary and secondary fixed types were installed. The costs of switching were reduced by installing large banks of switched units. Two-pole racks are used. Where switched capacitors regulate voltage, current-compensated, voltage-sensitive controls are used. The total additional investment for current compensation on an average residential feeder, said Reinbold, is about $2,250 as against $24,500 for a feeder regulator.

Step-by-step calculations for determining the number, size, and location of capacitor banks required in each section of a primary circuit to give desired voltage were described by Wilbert Bakker, Public Service Electric & Gas Co. Bakker said that voltage controls can be used on switched capacitors in lieu of substation regulators to control voltage on primary circuits.

Fischer Black, Electrical World, predicted 230% more output of electrical energy in 1968 than in 1958, a growth rate doubling every eight years. To do this, he said, the industry will have to go out and get some of the business the gas industry is planning on serving.

Limited pole space has resulted in the installation of primary capacitors for overhead lines in vaults adjacent to the pole line, said R. W. Tracey, Sangamo. Connections are run in conduit from the pole line. Submersible type reactors are used for this type of installation.

Tracy reported on submersible secondary capacitors for installation on networks also. Welded aluminum racks have been developed, he said, for the installation of capacitors on the pole. Replacing steel, they are expected to reduce corrosion problems.

To realize maximum benefits from capacitors, it is necessary to know how much, where, and when to install them, said R. R. Wylie, Sangamo. For this, he said, instrumentation is needed to determine how much load there is, how much of it is watts and how much vars, and when each occur.

Correlates Fuse Sizes

Glenn M. DeKraker and James E. Hall, Sangamo, described the meters available for these purposes. W. J. Thacker, Sangamo, related fuse sizes required for protection to pressures within the capacitor tanks and the resulting damage from excessive currents.

Type of controls for switching capacitors were discussed by W. C. Downing, Sangamo. These controls include the time switch, thermostatic controls, and those sensitive to voltage, current, or vars.

Before you buy anothertr

ertransformer...

EVALUATE INNOVATIONS

6% of General Electric's distribution-transformer sales goes to improve the product and reduce costs to you

Research in distribution transformers is a catalyst which speeds the normal rate of developments. To make innovations fast enough to keep pace with the unprecedented growth forecast for utilities, General Electric invests over three times as much, per sales dollar, as the average for all industry.

G.E.'s development of production line impulse testing, for example, increased average transformer life 15%. And development of grain-oriented core steel has saved over three hundred million dollars for electric utilities.

Other G-E innovations include: Strenicor clamps and bushings for copper or aluminum conductors. The return to you: a more durable and economical transformer to meet your system needs.

Before you buy another distribution transformer, evaluate innovations—give your transformer manufacturer credit for the extra values he gives you. G.E. Co., Schenectady, N. Y.

431-80

Progress Is Our Most Important Product

GENERAL ELECTRIC

GIVE YOUR TRANSFORMER MANUFACTURER CREDIT FOR THE EXTRA VALUES HE GIVES YOU

		G.E.	OTHER MFRS.			
MEASURE LOAD BUILDING—do Co.'s other products build load? Does Co. sponsor load-building programs?						
CHECK SERVICE—24-hour shipment? repair and uprating? emergency assistance?						
COMPARE FEATURES—how many exclusive features in terms of longer life; reliability; easy maintenance?						
ANALYZE PRICE—does Co. hold line against inflation with significant product developments?						
EVALUATE INNOVATIONS—has Co.'s research paid off for you? Recent examples?						

FILL IN THE BLANKS . . . See which manufacturer gives you more for your transformer dollar: Mark "X" for a measurable contribution, "O" for insignificant contribution.

How to save 77 years

The boy Galileo sat in the sanctuary of Pisa's great cathedral, observing the movement of a lamp which had been set swinging by a sudden gusty draft. The chain by which it was suspended from the high ceiling was of such a length that the arcs decreased but slowly. Strange thing, though. No matter how far the pendulum swung, its movement consumed the same time. Galileo made a note of that. The year was 1581.

The old man sat at his writing desk, sixty years and a thousand disputes later, writing down a new theory. The regularity of a swinging pendulum might be combined with a spring mechanism to improve the unreliable clocks of that day. So Galileo scribbled on, and did nothing more about it. A number of years after his death Huygens took the notes and invented the pendulum clock. *Seventy-seven years had elapsed since the boy made the observation upon which it was based!*

The creative thinker today still need not have a specific use in mind when, by equation or formula, he branches off from the accepted to the hitherto unknown. The classic invention of this decade, the transistor, evolved in the Bell Telephone Laboratories as scientists sought a deeper understanding of semiconductors. On the other hand, another great invention, the feedback amplifier, came from the acutely creative mind of one Bell engineer faced with a specific problem.

Current Bell Laboratories activities—in such areas as data transmission, radar and submarine cable development—call for the coordinated efforts of all types of thinkers and all types of approaches. One type complements another.

Today, seventy-seven years would not have elapsed between the swinging lamp and the swinging clock pendulum—certainly not at Bell Labs, where ideas, though not rushed, are carefully advanced toward fruitful application in national defense, industry and communications. An important part of this harvest is the efficiency of America's telephone service, unequalled anywhere else in the world.

BELL TELEPHONE LABORATORIES

WORLD CENTER OF COMMUNICATIONS RESEARCH AND DEVELOPMENT

Westinghouse Consolidates Distribution Apparatus Operations

Essentially a self-contained unit is Westinghouse Electric Corp's plant near Bloomington, Ind., recently completed for the switchgear distribution apparatus department. Facilities for the design, manufacture, and marketing of equipment are provided on a 148-acre tract.

A one-story, 253,000-sq ft factory will produce power capacitors, lightning arresters, fuse cutouts, oil circuit reclosers and switches. A two-story, 35,000-sq ft office building will house sales, engineering, purchasing, industrial relations, accounting, and administration personnel.

In planning the new plant, Fred F. Herman, manager of the department, stressed the need for flexibility and a move toward automation.

Following are some significant features of the plant.

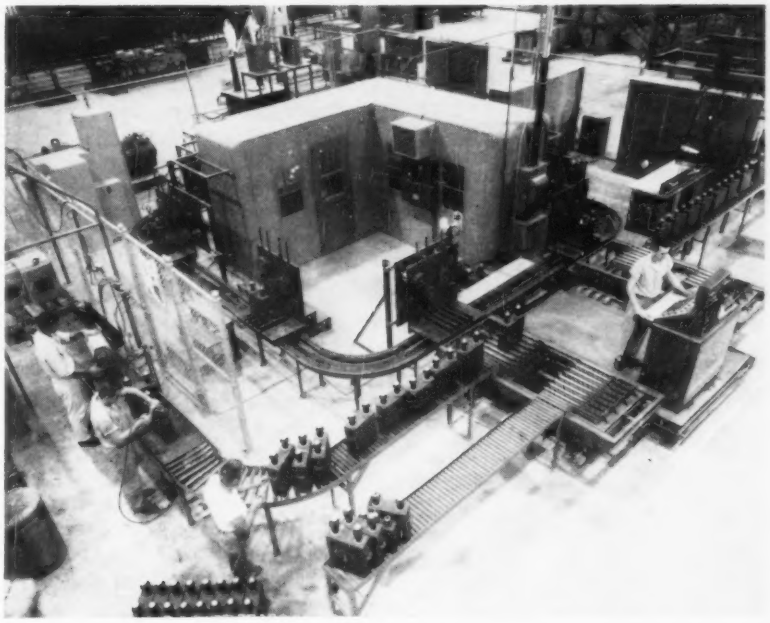
The Bloomington laboratory facilities has five areas: capacitor, general, high voltage, high power, and weather testing.

• Manufacture and Testing of Capacitors — These operations are automated at the Bloomington plant. This line can be divided basically into four areas: section winding, assembly, impregnating, and testing.

Alternate layers of insulating paper and sheets of aluminum foil are wound into sections which are assembled in fabricated cases. The assemblies are placed in large ovens, then evacuated and impregnated. This operation is controlled from panels located near the ovens.

The automated capacitor test facility (see picture) is a "merry-go-round" type. As a capacitor is moved automatically to the first station from a conveyor, a punched card is fed into a master reader which automatically programs the tests for that particular capacitor. A sequenced conveyor carries the capacitor through six tests: capacitance, 60-cycle overpotential, d-c overpotential, 25-cycle overpotential, recheck capacitance, and finally resistance. One man operates the test center.

• High-Voltage Laboratory — In the engineering laboratories, 95% of all the test work that is required in the research and development of new products is accomplished. For the remaining 5% of tests, the company's laboratory facilities in East Pittsburgh, Pa., are used.



• Finishing Department—The department is highlighted by an automatic bright dip machine. This machine was installed because of the large volume of work to be cleaned both for electroplating and for internal parts for lightning arrestors.

• Lightning Arrester Test — For each silicon carbide lightning arrester two blocks are assembled into 6-kv units, fitted with a series gap and energized at 6 kv. A surge generator discharges two 10,000-amp 12 × 45-microsecond waves through the blocks.

In addition, an automatic test and inspection machine checks and sorts lightning arrester gap resistance spacers at a rate of 1,800 spacers per hour. Depending on its resistance, each spacer is distributed to one of seven collecting rods.

• Assembly Turntables—These devices are located throughout the plant. For example, the CSO oil switch turntable has four assembly fixtures attached. The operation has been broken down so that the time cycle is balanced for each operation. One of the chief advantages of a turntable for assemblies is that fixtures are returned to the starting point.

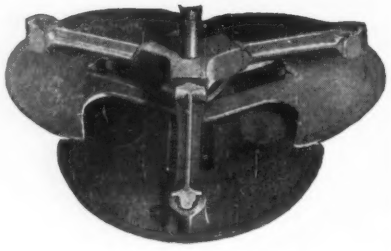
Armor-Grip Data Issued

Preformed Line Products Co, Cleveland, O., has issued a data folio on Armor-Grip Suspension products which gives technical and non-technical personnel four types of information: (1) "Detailed Technical Information" (24 pages for electrical engineers); (2) "Descriptive Brochure" (20 pages, on broader aspects of AGS as it applies to power transmission); (3) Information on prices, sizes, ordering—for the purchasing agent; and (4) "Application Procedure" (12-page booklet). The four phases of working information can be separated for various departments involved, or retained in the folio pockets. Preformed Line Products Co, Sales Promotion Dept, 5349 St. Clair Ave, Cleveland 3, Ohio.

The Old Reliable

EVERSTICK ANCHORS...

EXTRA Holding Power
QUICKLY Installed
TOUGH For long life



● They speed up work and provide dependable anchorage in new construction and maintenance. Quick and easy to install—made of tough rust-resistant malleable iron—their holding power "tops" all other. Available two-way, three-way, four-way, and cone types. Write for facts.

Exclusive Everstick nut housing Locks anchor firmly on rod. No chance of rod slipping thru anchor.

EVERSTICK ANCHOR CO
FAIRFIELD, IOWA

How 22 Manufacturers View 1959

(*Continued from page 30*)

Leeds & Northrup Co

"Rising costs of electrical generation and distribution will continue to be met in part by use of computers and data-reduction methods for boiler control, load-frequency control and load assignment. The coming larger steam generators will require more complete, more sophisticated controls. Dollar volume should increase slightly if the industry's plans are implemented."

Donald E. Moat, Vice President, Marketing

Line Material Industries

"Our market studies indicate 1959 will be a year of accelerated growth for electric utilities and good business activity for their suppliers. We confidently expect and are prepared for our business to rise to new levels in 1959."

R. G. Wheaton, President

Brown Instruments Div, Minneapolis-Honeywell Co

"Instrumentation in 1959 will enjoy a more encouraging business climate after a year of widely divergent trends. Even though capital spending promises to be higher than last year, but still well below the 1957 peak of $38.4 billion, there remain heavy forces at work pointing toward modernization and improvements in plants and processes. An active field for instruments will be the expanding power industry."

Henry F. Dever, President

Pennsylvania Transformer Division, McGraw-Edison Co

"Unfilled orders at the beginning of 1959 are about 30% less than at the start of 1958; however, new orders booked during the last quarter of 1958 showed some improvement and, with continued improvement in general business conditions, we expect a higher volume of distribution transformers and substation power transformers to be placed in 1959. New orders for generating station transformers will be lower. With announced and to-be-announced products, we expect our total 1959 shipments to be approximately 10% above 1958. Prices should stabilize at a higher level because of recent and expected cost increases."

W. R. Swoish, Vice President

Preformed Line Products Co

"Preformed Line Products forecasts a 17% increase in 1959 sales volume. This is based on a more intensive promotion program, new product development by PLP research and engineering, maintaining higher levels of factory and distributor stocks, and closer communication with our utility customers."

Thomas F. Peterson, President

John A. Roebling's Sons Corp

"In 1959, we expect a continuance of the gradual business improvement that started after we hit our recession low point last April. Our prediction is based on a study of key American industries from which we derive most of our business. Everything considered, 1959 looks fairly promising. Roebling might top 1958 by 15-20%, and expects to start 1959 with an order backlog a little over $10 million."

C. R. Tyson, Executive Vice Pres.

RT&E Corp

"We see 1959 as the best year RT&E has ever experienced for both earnings and sales. Our new plant in Portland, Ore., an extensive new engineering and development laboratory at Waukesha, Wis., and several new products will play an important part in building our new sales peaks."

C. W. Shaw, Executive VP

Sangamo Electric Co

"We expect that our sales to the central station industry in 1959 will exceed 1958 sales by possibly 10%. Substantial increases in other lines should increase the overall business of the company by perhaps 15%."

C. H. Lanphier, President

S&C Electric Co

"The year ahead will be better for the switchgear industry from the standpoint of sales. The electric utilities already show evidence of firming up their plans and purchases. . . . The profit prospect is something else again. Unless the electrical apparatus manufacturers divest themselves of their perennial appetite for price cutting and "white sales", profits may continue deleterious decline." *John R. Conrad, President*

(*Continued on page 48*)

No. 11 in a series

Right off the Wire

Before the first nuclear-powered merchant vessel is launched, a new reactor system which has been designed is expected to reduce the cost of a comparable installation by forty per cent.

After leaving a new electric shaver plugged into an outlet overnight it can be used for a week without recharging.

A radio operator's vest, with pockets for dry cells, can be worn under outer garments in arctic cold. The batteries, when kept warm by body heat, are said to last ten times longer.

Automobile batteries are now made with cells which can be removed and replaced in a few minutes.

A new electronic surveying technique, now in use in highway layout work, enables engineers to establish numerous ground control points and measure distances in a matter of minutes. Maximum possible error is only 11 inches in 40 miles.

Copper strip is being made from powdered metal. The process can also be used for other metals which can be combined in no other way.

A portable building for use in the arctic has hollow walls of nylon fabric. When the walls are inflated the building stands erect.

A research program has begun for the study of new semiconductors for use in transistors. The materials are indium phosphate, gallium arsenide, aluminum antimonide.

An insulated guard rail for the end of the boom is made to protect a crane operator in case of contact with a power line.

More and better rayon is the object of a study of cellulose growth in living trees. Two-year-old pines are injected with radioactive carbon and are later cut down for examination.

A new plastic adhesive used in aircraft construction is semi-elastic and stronger than the metals it joins.

A new titanium alloy is made into sheets that will withstand air pressures of over 100 tons per square inch.

The "world's loudest noise" can be produced by a new compressed air loud speaker that is capable of projecting the human voice for ten miles.

Further information on these news items and on Simplex cable is available from any Simplex office. Please be specific in your requests.

Twelve pneumatic tires, each supporting a load of 20,000 pounds, enable a new lift to pick up and move concrete pipe sections at five miles per hour.

The Post Office Department has awarded a contract for the development of a mechanical letter-sorting machine.

Aerodynamic shapes designed to travel at over 8,000 miles per hour can be tested in a new wind tunnel.

Layers of steel, bronze and a mixture of lead and plastic compose a new dry bearing material that requires no lubrication.

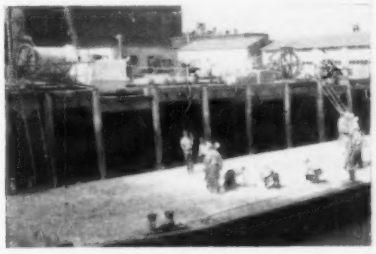
Coils of aluminum, plastic or steel, up to 82″ O.D., can now be spiral wrapped by machine.

A new method of producing electricity uses a fuel cell that converts hydrogen and oxygen into direct current by means of a catalyst.

A new recording instrument measures heat absorption in any area and is used for allocating air conditioning or heating charges to tenants.

Quartz tubing is being made so small that fifty feet contain only one drop of water.

A new heat resistant paper is made of ceramic fibers.



Simplex Goes To Sea

The 36,000-foot "sea section" of the Simplex submarine communication cable, for use between Cape Neddick, Maine, and Boone Island Light, was loaded in August at Boston.

The cable came off a giant reel (dia. of head 126 inches) and was carried over a capstan to the 126-foot barge.

The cable is described as "4-conductor, No. 9 AWG stranded, ANHYDREX insulated, armored submarine communication cable."

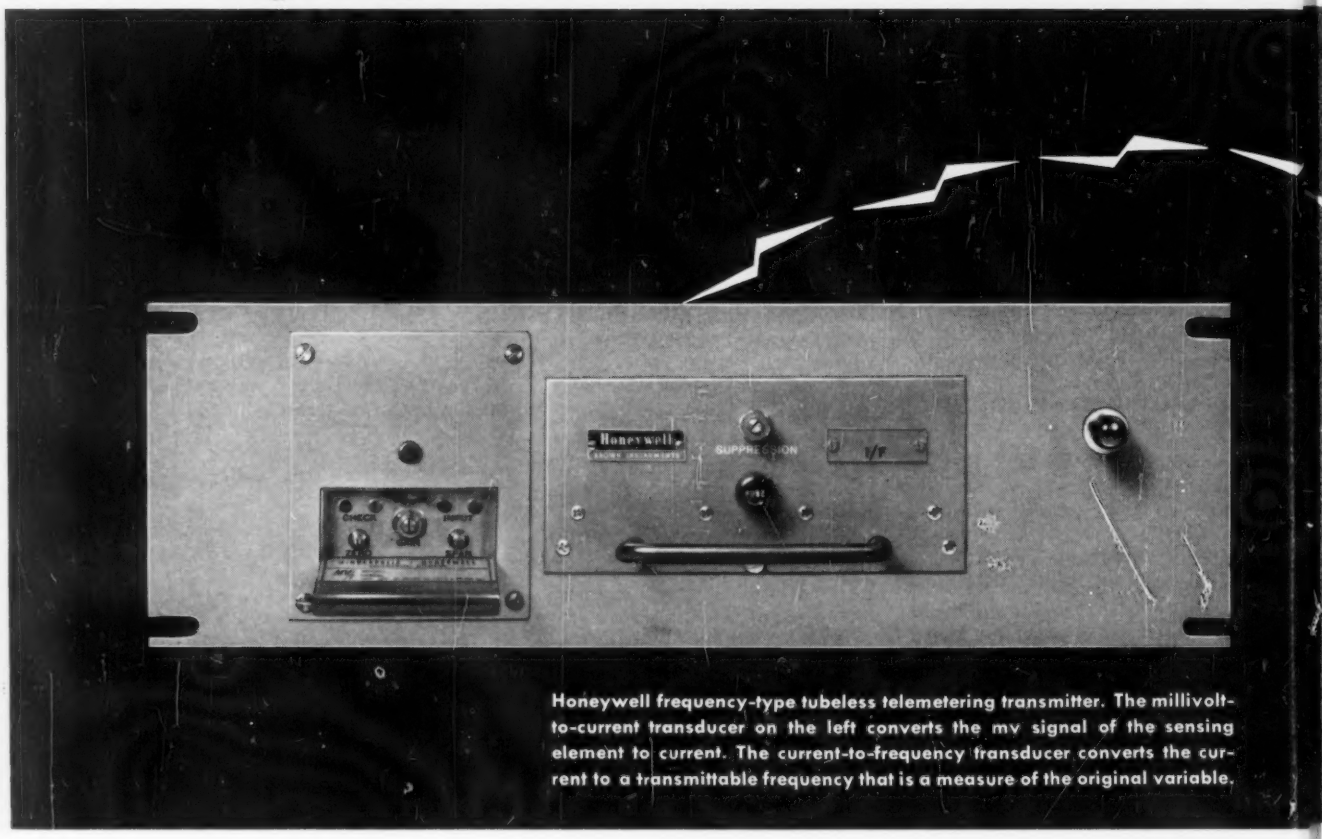
The reel and its load of more than six miles of cable weighed 68 tons.

SIMPLEX WIRE & CABLE CO.
Cambridge, Massachusetts and
Newington, New Hampshire

Simplex

Original world's cables for Mining · Power & Lighting · Construction · Transportation · Communications · Signalling

NEW Tubeless



Honeywell frequency-type tubeless telemetering transmitter. The millivolt-to-current transducer on the left converts the mv signal of the sensing element to current. The current-to-frequency transducer converts the current to a transmittable frequency that is a measure of the original variable.

Withstands extremes of ambient conditions without loss of its high accuracy

Use this new system for telemetering load, control intelligence, or any variable that can be transduced to an electrical signal. It incorporates solid state components—transistors and magnetic devices—for highest long-term reliability.

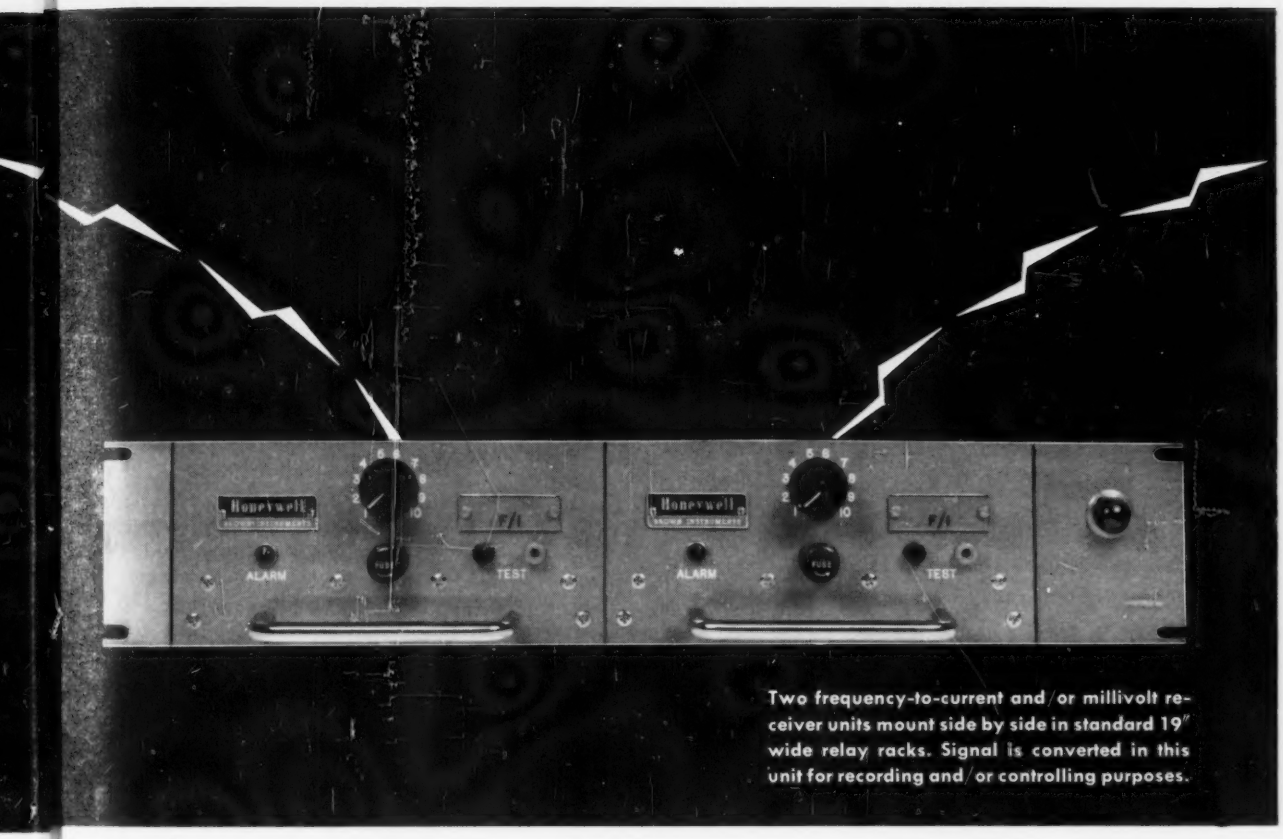
Designed to meet all central station requirements, it's suitable for all types of telemeter channels, including lowest-cost leased lines.

Your nearby Honeywell field engineer can give you complete details. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Aves., Phila. 44, Pa.

● **REFERENCE DATA:** Specification S-301-1

Telemetering System



Two frequency-to-current and/or millivolt receiver units mount side by side in standard 19″ wide relay racks. Signal is converted in this unit for recording and/or controlling purposes.

Some of the features of Honeywell's telemetering system:

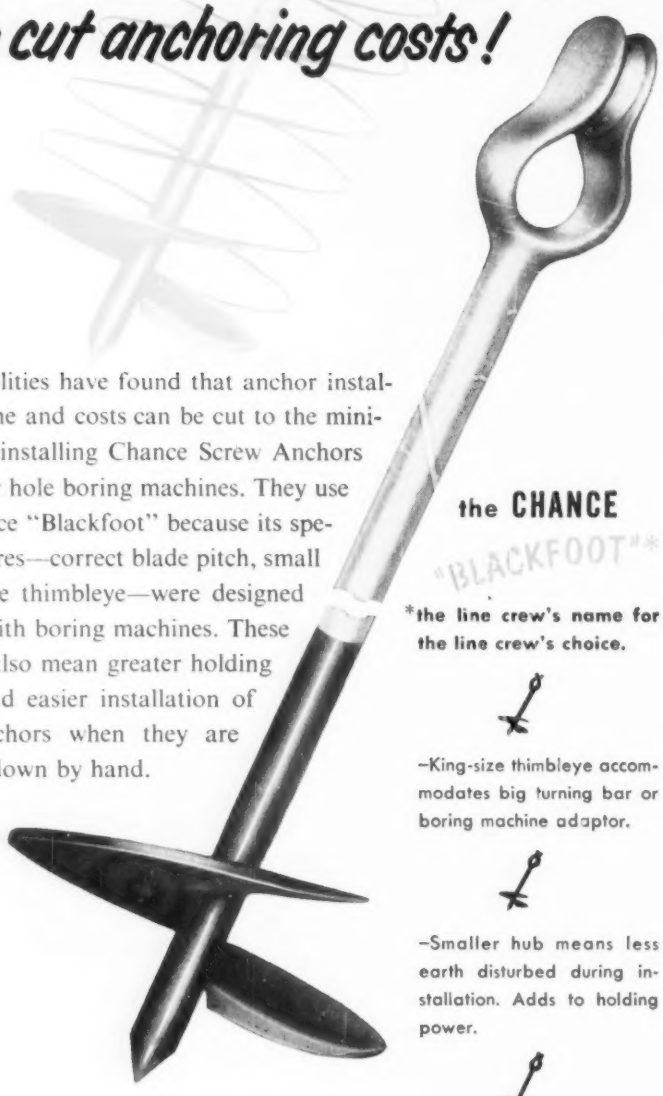
- Accuracy: ± ¾% from 30 to 120°F. ambient temperature.
- Linearity: within 0.1%.
- Speed of response: One second for 95% of scale.
- Wide frequency band (5 to 15 cps or 6 to 30 cps) provides improved resolution.
- Standard 19″ relay rack mountings; space-saving, drawer-type construction.
- Modular plug-in construction.
- Field tested for over two years.

Honeywell

H HONEYWELL *First in Control*

PUT 'EM DOWN BY MACHINE
to cut anchoring costs!

Many utilities have found that anchor installation time and costs can be cut to the minimum by installing Chance Screw Anchors with their hole boring machines. They use the Chance "Blackfoot" because its special features—correct blade pitch, small hub, large thimbleye—were designed for use with boring machines. These features also mean greater holding power and easier installation of these anchors when they are screwed down by hand.



Chance Screw Anchors are available in sizes from 4" to 15" in diameter. You can get them from stock from your anchor distributor.

the CHANCE "BLACKFOOT"*

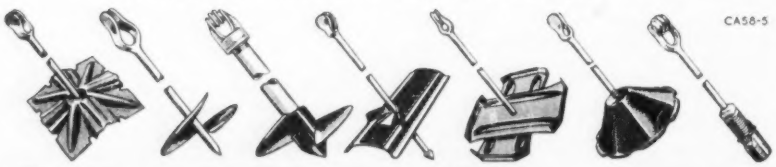
***the line crew's name for the line crew's choice.**

–King-size thimbleye accommodates big turning bar or boring machine adaptor.

–Smaller hub means less earth disturbed during installation. Adds to holding power.

–Blades are accurately "pitch-controlled" for fast-cutting, speedy installation.

...and there are CHANCE ANCHORS for all other soil and guying conditions...



CA58-5

A·B·CHANCE CO· CENTRALIA MISSOURI

(A·B·CHANCE CO. of Canada, Ltd., Toronto)

Manufacturers View 1959

(*Continued from page* 44)

Square D Co

"The establishment of a corporate research and development activity reflects the increasing technological range of Square D's segment of the industry. This is a natural next step in our continuing program to strengthen and enlarge our sphere of engineering operations for what lies ahead."

John D. Leitch, Engineering VP

Westinghouse Electric Corp

"A steady improvement in billings and new orders is in prospect for Westinghouse, but sales billed will probably fall short of 1957.

"With the prospects of a good but not a record-breaking year for the electrical manufacturing industry, the pattern of increase in sales and orders will not be uniform across the wide variety of the industry's product lines. In addition, rapidly increasing costs will require the industry to look beyond rising volume to relieve a tightening profit squeeze.

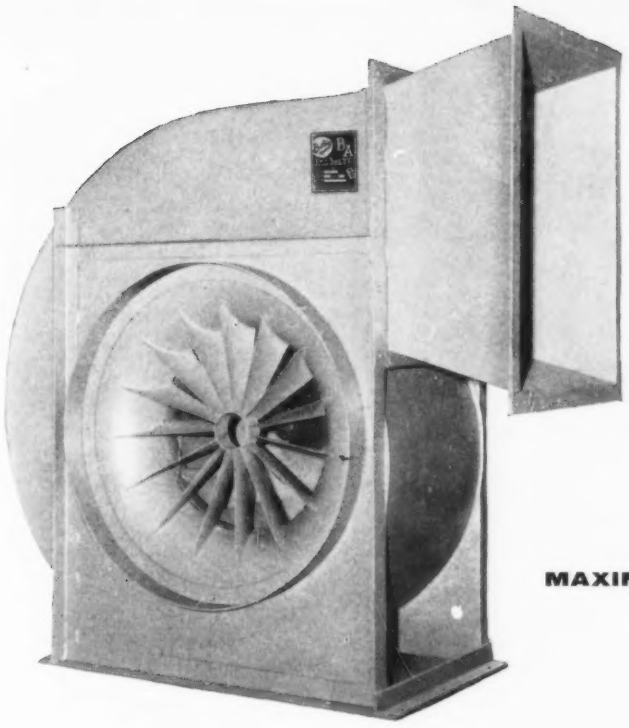
"In the electric utility field, the shipment of heavy generating apparatus will be lower than in 1958. However, this drop will be offset to an extent by an increase in billings of distribution equipment. New orders from electric utilities for heavy generating apparatus and from industry for large electrical equipment are expected to show marked improvement over the low points reached in 1958.

"In the atomic power field, Westinghouse anticipates continued growth, with billings this year expected to exceed the previous 12-month period for the fourth consecutive year. Atomic backlogs at year end are expected to be approximately 30% higher than in 1957, most of which represent equipment for the nuclear Navy.

"Orders for defense products are expected to continue to rise, particularly in the first half, with the possibility of a leveling out later.

"Westinghouse expects sales of appliances and other consumer products, defense products and light industrial equipment to provide strong support for the anticipated increase in billings."

Gwilym A. Price, Board Chairman



DECIDING ON AIRFOIL?

INSIST ON "BUFFALO"

Mechanical Efficiency up to a True 92%

MAXIMUM FORCED-DRAFT PERFORMANCE UNDER SPECIFIC CONDITIONS

WHEN YOU INSIST ON "BUFFALO" AIRFOIL FANS you immediately find many important factors in your favor. "Buffalo" Airfoils give you *true* mechanical efficiencies up to 92%. Main point here is that "Buffalo" Airfoil Fans will positively *live-up* to their ratings. They are designed, engineered, built and tested to deliver these peak efficiency ratings. You can *rely* on "Buffalo" Airfoils to meet your performance specifications.

There are sound engineering "reasons why" behind the proven performance of "Buffalo" Airfoil Fans. "Buffalo" offers unique, deep-blade airfoil design plus a brand new approach to streamlining. Turbulence is reduced to an absolute minimum because of the smooth inlet bell — the matching curved wheel flange — the new "Buffalo" divergent outlet. And with "Buffalo", you get more than an airfoil fan — you can choose from a *complete line* of airfoil and semi-airfoil wheels, to give you maximum efficiency for your precise operating conditions.

Whichever "Buffalo" Fan *you* select as best-suited to your operation . . . you're sure of getting the famous, rugged, dependable, long-lasting construction that's been an integral part of every "Buffalo" product for more than 80 years. We call it the "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.

For the Finest in Mechanical Draft Service, Write Us now for Bulletins FD 106, FD 205, and F 200.

BUFFALO FORGE COMPANY
BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

ALLIS-CHALMERS — 25 years of 5/8% Regulator Leadership

4 steps to "Engineered Regulation"

Plan to stay ahead... MODERNIZE!

- cut revenue loss
- cut cost of regulation
- improve service

All power systems use regulation, but few realize the greatest possible benefits. That is why the "engineered regulation" approach is recommended.

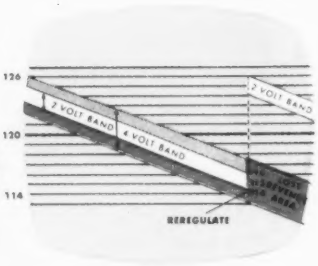
"Engineered regulation" means:

1. Use narrow 2-volt band widths.
2. Reregulate feeders.
3. Use lower cost 5/8% step regulators.
4. Utilize the complete potential of *Vari-Amp* and its short-circuit ratings so the smallest, lowest cost unit can be used at a given location.

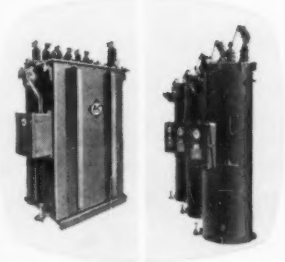
"Engineered regulation" is an art. Allis-Chalmers engineers can be of great assistance to you. Call your nearby A-C office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

Vari-Amp is an Allis-Chalmers trademark.

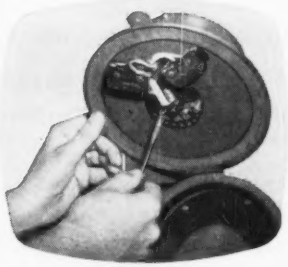
cut band width



reregulate



use low-cost units



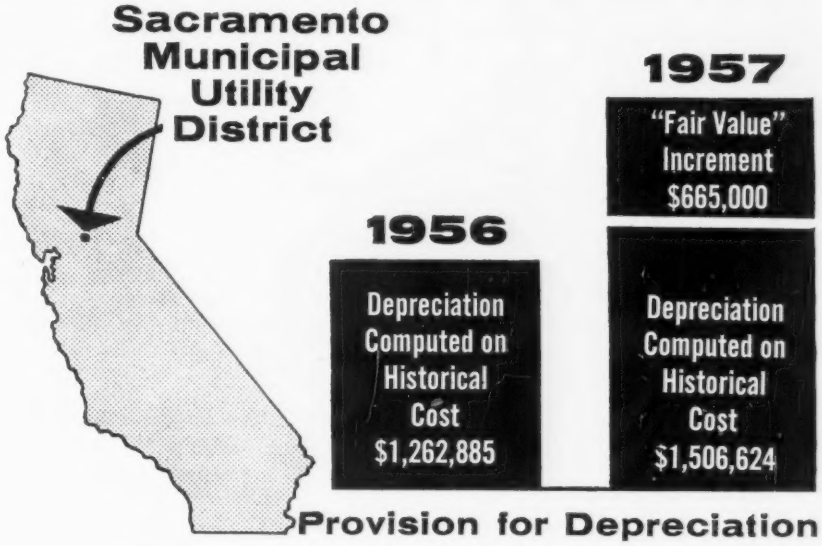
use smaller ratings

Originators of 5/8% Step Regulators

ALLIS-CHALMERS A-C ALLIS-CHALMERS

A-5859

Finance



SMUD: Fair Value Depreciation

Sacramento Municipal Utility District now accrues depreciation on fair value. While spokesmen of the investor-owned utilities have been urging commissions, with no success, to recognize the need for economic depreciation in order to recover all the costs of operation in rendering service to the public, this California municipal group has done it. The SMUD annual report for 1957 states:

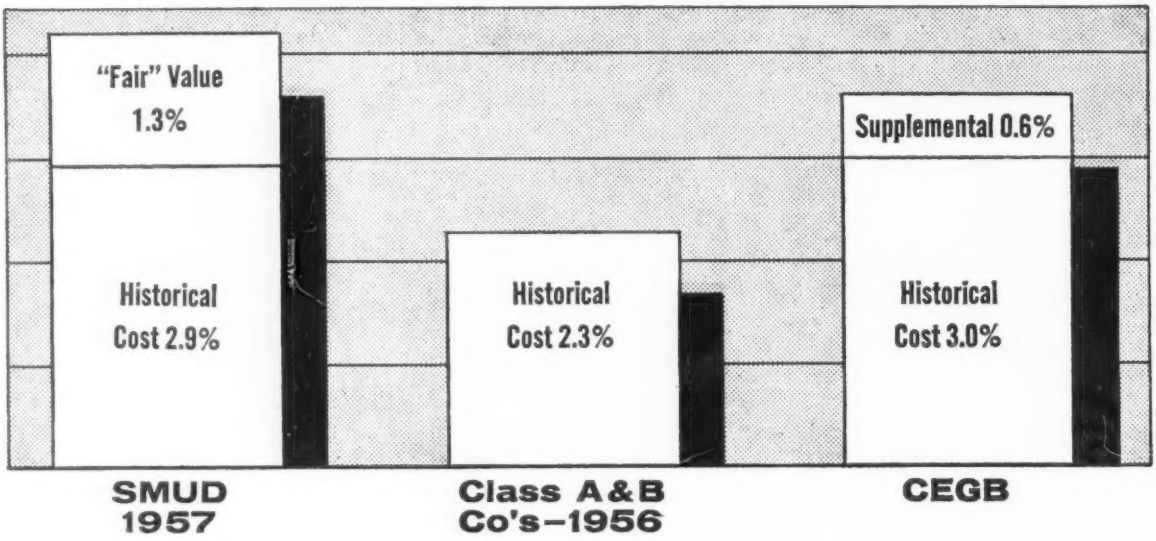
"The District accrues depreciation on its properties according to the straight-line method, based on engineering determination of the service lives of the individual property units. In 1957 the District adopted with the full approval of its independent auditors, Arthur Anderson & Co, the principle of providing depreciation based on the fair value of its property. In periods of substantial inflation or deflation, because of changes in the purchasing power of the dollar, depreciation based on cost is not a fair measure of the property consumed in operations. This principle of accounting, sometimes referred to as 'price level depreciation,' recognizes that a utility should collect in revenues an amount to cover the fair value of its property consumed in operations if the real capital dedicated to the business [which for the District is its customers' equity] is to be maintained."

Effect on SMUD's 1957 net revenue is a reduction of $665,000—the amount by which fair value depreciation exceeds cost depreciation. This amount charged against revenues is in the balance sheet as a credit to "Accumulated Price Level Depreciation," a part of "Customers' Equity Employed in the Business."

As can be seen in the chart above, the fair value depreciation accruals of some $2,172,000 are about 45% higher than the depreciation accruals based on original cost, and about 72% higher than the 1956 provision for depreciation. The 1956 income statement also includes a $430,856 charge for amortization of intangible plant costs—the last of such charges over a ten-year period.

The auditor's report makes interesting reading. It says in part: "As set forth in note 1 of the accompanying financial statements, the statement of net revenue

Percent Depreciation Accruals to Plant



reflects an additional charge for depreciation of $665,000; this charge is equivalent to the amount by which depreciation computed on the cost of depreciable property adjusted to reflect current price levels exceeds depreciation computed on cost. Although this practice is not yet recognized as a generally accepted principle of accounting, it is our opinion that, for the District, it results in a fair statement of net revenue for the year, and we have approved its adoption."

The note referred to states in part: "Consequently, depreciation based on historical cost of tangible property no longer represents a fair measure of the cost of property consumed in current operations. Accordingly, coincident with the completion of the amortization of intangible assets, the District inaugurated the policy of providing annually an amount representing the difference between depreciation computed on property adjusted to current price levels and depreciation based on the historical cost; such additional provision for 1957 amounted to $665,000."

This policy gives SMUD depreciation accruals equal to 4.2% of gross plant, of which 1.3% is the increment for fair value and 2.9% is based on historical cost. The same figures for the Class A & B utilities in 1956 amounted to 2.3%, as shown in the chart. It is of interest to note that Sacramento has only distribution plant, and yet its depreciation ratios are 26% higher when based on historical cost and 83% higher when based on fair value. SMUD has no production plant, while in the case of the investor-owned utilities, 41% of the total expenditures is for such plant. It would appear therefore that even on so-called historical cost, a 2.9% depreciation rate for a distribution system is already giving substantial recognition to fair value depreciation. The third bar on the chart shows the rate of depreciation of the British Central Electricity Generating Board, where a rate of 3% on historical cost is increased further by an increment of 0.6% for "supplemental depreciation."

SMUD credits the fair value increment to "Accumulated Price Level Depreciation," a part of the "Customers' Equity Employed in the Business." In an investor-owned utility, this could be considered the equivalent of earned surplus, but the similarity is more apparent than real. In the Class A & B utilities, earned surplus represents only 8.2% of net book plant. Sacramento's "Customers' Equity Employed in the Business" amounts to 71% of plant. SMUD

has no stockholders, of course, so all of its net income is credited to this account instead of going partially for dividends.

However, if it is assumed that over ten years investor-owned utilities paid no dividends, then the earned surplus instead of a modest $2.41 billion which it was at the end of 1956, would have risen to $9.65 billion—still only 32.5% of the total investment in plant. Even under this hypothetical condition, therefore, they would enjoy considerably less than half the self-financing available to Sacramento Municipal Utility District.

The Sacramento MUD is fortunate in not having to pay any taxes, and also in not being under the jurisdiction of the California commission. For all that, it is clear that it not only enjoys a tax differential over investor-owned utilities, but by virtue of being able to base its depreciation on current values it will maintain itself in much better financial health in the future than the investor-owned utilities could ever hope. If the regulatory or financial climate became adverse, the private segment of the industry might be unable to finance and consequently to supply the growing demands of its customers. Municipalities with their tremendous plow-back of earnings and with the additional benefits of depreciation based on fair value would be able to do whatever financing is needed by using their customers' money. It is of interest to note that in the recent California hearings the opponents of liberalized depreciation have charged that the normalization of taxes makes the customer an involuntary contributor to the capital needs of the utility. The question could well be asked as to how they would regard the self-financing of a municipal utility wherein nearly three-quarters of the plant costs have been contributed by the customers.

BROOKS

LINDSETH

CEI Banks on Growth, Economy

Fuel economies and a rapid recovery from the business recession have helped Cleveland Electric Illuminating Co to maintain 1958 earnings at about the 1957 level, F. Warren Brooks, the company's financial vice president, told the New York Society of Security Analysts Dec. 17. Brooks summed up CEI's outlook for growth, financing, and Ohio's regulatory climate. Elmer Lindseth, CEI president, participated in the question-and-answer session.

CEI has revamped its coal supply patterns to offset rising rail freight costs. The company has shifted its source of supply northward, so that today Ohio mines supply more than 80% of CEI's coal. Best known innovation is the coal pipeline, "now operating consistently above rated capacity and supplying nearly half of CEI's total requirements." In another cost-cutting move, CEI now hauls about one-quarter of its coal in trucks; and nearly all the coal that is still shipped by rail moves at truck-competitive rates. Brooks also pointed to additions of new generating equipment which have reduced system heat rate to about 10,700 Btu—nearly 30% below ten years ago.

The St. Lawrence seaway brightens Cleveland's future. Brooks said that northeast Ohio has room for any expansion the Seaway will bring. Industry now occupies about 25,000 acres, but another 30,000 acres are already zoned for industrial use and a total of 200,000 acres is suitable for new plant location.

Ohio's regulatory climate is another plus, said Brooks. Bills have been introduced consistently to change the state's "Reproduction Cost New Less Depreciation" rate base law, and next year will be no exception. But, said Lindseth in answering a question from the floor, so far Ohio utilities have been able to beat them all by showing that electric rates in Ohio under RCND compare

favorably with rates in neighboring states, while Ohio's healthy utilities have done much to help the state's industrial development. In 1957, more electric power was sold in Ohio than in any other state.

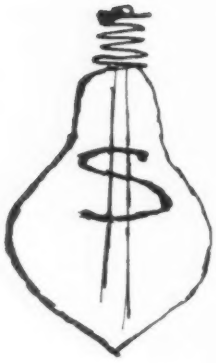
CEI's financial outlook is enhanced by a rate increase which should provide about $2.5 million next year and $5.5 million in 1960. The company anticipates construction outlays of more than $200 million in the five-year period 1959-63, with about 60% of cash requirements to be generated inside the company. Outside financing will probably be necessary at least twice. Both issues are likely to be bonds.

• • •

FINANCE

Public Service Co of New Mexico got two "go-ahead" signals on expansion:

• **PSC granted** the company authority to purchase a $1.5 million power line running from Albuquerque to the uranium-rich Ambrosia Lake area near Grants.



PSC permission to buy the 115-kv 79-mi line was granted over the opposition of two petitioners, the Continental Divide Electric Cooperative Assn and W. Ralph Bailey of Albuquerque, a PSCo customer.

• **Stockholders approved** an amendment to company's certificate of incorporation, increasing the authorized preferred stock from 60,000 to 150,000 shares.

PSCo President D. W. Reeves told stockholders: "In considering financing for 1959 it is quite evident that preferred stock offers a reasonable approach, since our long term debt is now about 61%, preferred about 5¼% and common about 34%." Action by the stockholders is therefore necessary, the company said, to provide for issuance of preferred stock so that the company will be in a position to take advantage of favorable money markets. It would appear probable that financing requirements for 1960 and 1961 can be met by selling bonds without increasing the long term debt ratio beyond safe limits.

Electric utility companies should give financial analysts time to write about their companies between filings on new issues and should go slow on announcing underwriting plans. Many firms stop their analysts from working on a company writeup from the date they hear of the underwriting until 40 days after the issue is sold. This can exceed 100 days. Registrations not carried through should be withdrawn as soon as possible, as the analysts cannot write about the company while there is a registration statement on file before the SEC.

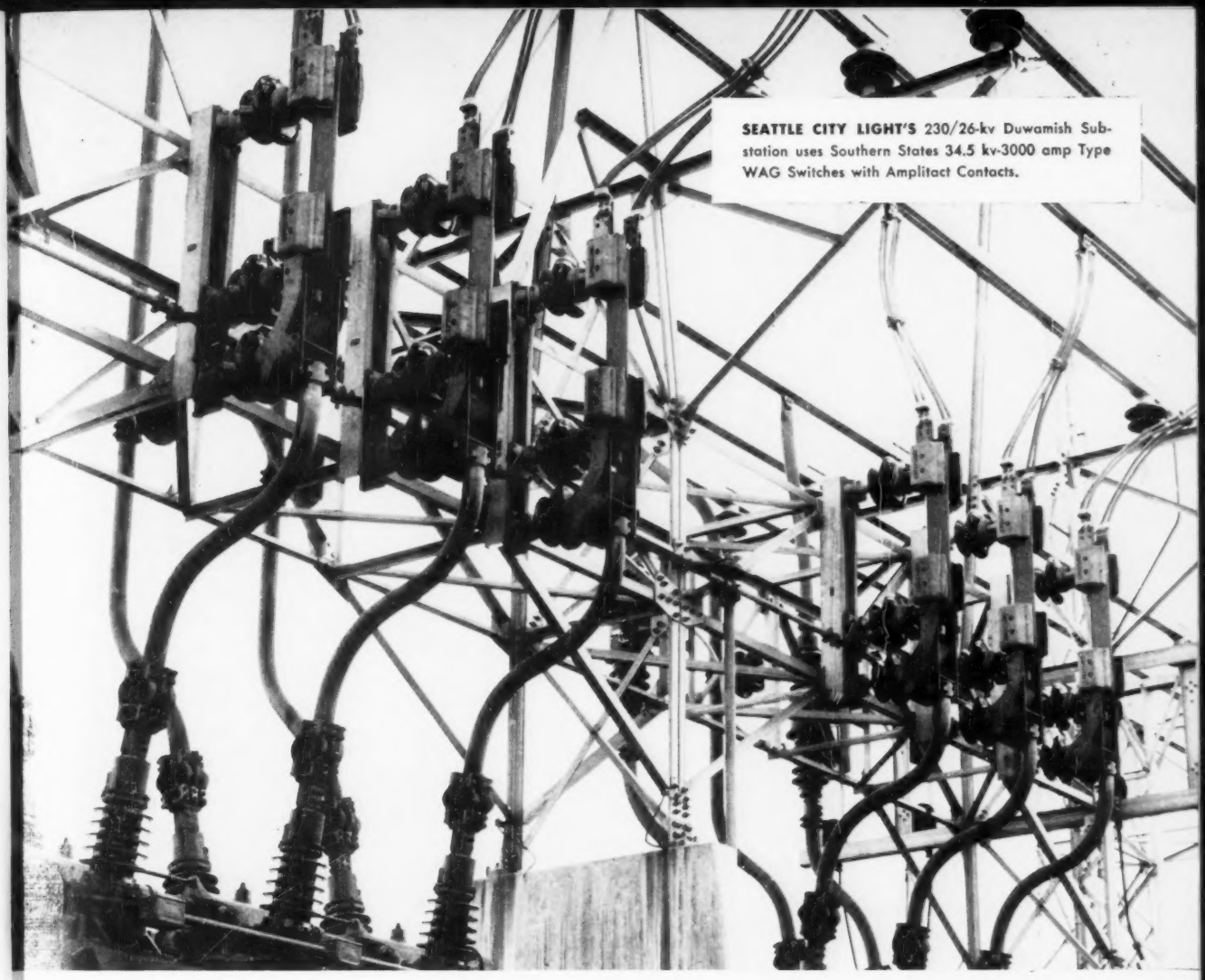
RATES & REGULATION

Public Service Co of New Hampshire and its sub, New Hampshire Electric, have asked the PUC for a $1,260,782 a year rate hike, double the amount sought originally in a petition for higher rates filed last June. Reason for the increase: "Earnings are not as good today as when we filed last June 10," said the company's attorney, Franklin Hollis.

Central Hudson Gas & Electric has filed for a $1.4-million annual rate hike with the New York Public Service Commission. The increase would apply to all classes of service effective Feb. 26, upping bills "from 1¢ to 3¢ a day for the majority of residential customers." Behind the hike: Rising costs.

Wyoming municipalities are seeking new utility laws. Mayor Paul Wataha of Rock Springs has made these recommendations to incoming Governor Hickey:

That the municipality get a copy of the annual report of each of the utilities serving it to give city officials a chance to analyze company operations and question "any item that might be abnormal"; that legislation be approved to require the utilities to file a report covering a minimum of three years to indicate what plans for replacement of existing facilities may be made to eliminate a "lot of the piecemeal repairs" that increase cost of operations and disturb streets.



SEATTLE CITY LIGHT'S 230/26-kv Duwamish Substation uses Southern States 34.5 kv-3000 amp Type WAG Switches with Amplitact Contacts.

The Man-sized Switch for Man-sized Jobs

FIG. 1

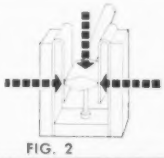


FIG. 2

AMPLITACT® CONTACTS ON WAG

High pressure Amplitact contacts provide maximum dependability under high current short-circuit conditions. The arrows in Fig. 1 show direction and relative magnitude of electromagnetic forces induced when switch is subjected to fault current.

The resultant electromagnetic forces, as shown in Fig. 2, greatly increase contact pressure and positively hold blade in the engaged position. For complete details, write for Bulletin 56AM on the Amplitact.

"Don't send a boy to do a man's job" is a saying especially applicable when choosing switchgear that must safely carry 3000-4000 amperes. Not only must it be capable of carrying such loads after years of service, but it may be called on to withstand fault currents up to 120,000 amperes without damage.

It's a man-sized job. Dirt, industrial waste, years of exposure to every type of contamination make the job even tougher. It takes a man-sized switch!

The Type WAG illustrated above is a good example. It's big and tough enough to carry its rated load continuously without excessive temperature rise. A built in safety factor more than compensates for the deteriorating effects of long, hard service. Amplitact® contacts provide high pressure for handling the heaviest faults.

The WAG is finding wider and wider acceptance in all ratings. It's now in service in virtually every state in the union.

Get complete details from your Southern States representatives or write direct for our latest bulletin.

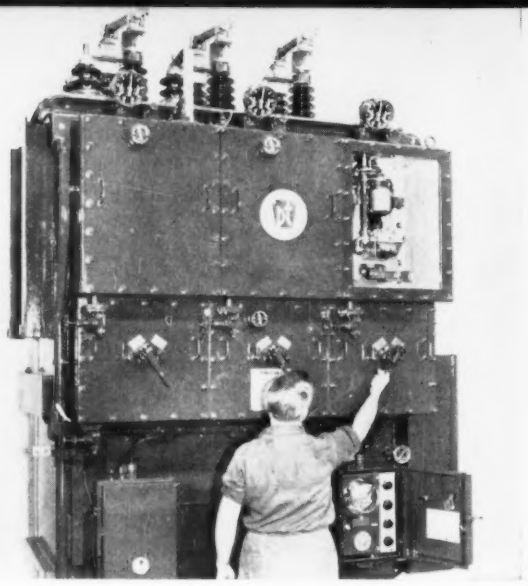
LIVE BETTER ELECTRICALLY

SOUTHERN STATES
EQUIPMENT CORP.
HAMPTON, GEORGIA

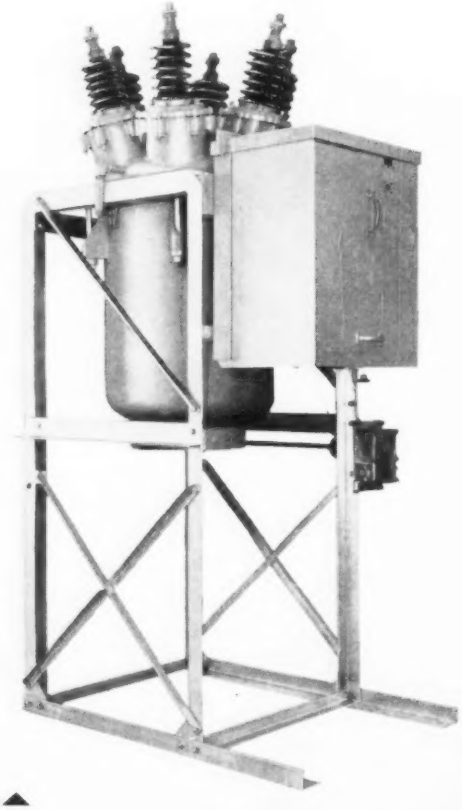
IN CANADA: Dominion Cutout Co., Ltd., Toronto

New Equipment

LTC Transformer . . .



. . . provides individually controlled voltage regulation for each phase. It also permits safe inspection and maintenance of the LTC contacts and drive mechanism while the transformer remains energized. Called the "Pennsylvania Phase-Isolated Load Tap Changing Transformer," the unit is equipped with a manually operated combination switch for bypassing, disconnecting and grounding. The 20% LTC range is apportioned 11% above rated voltage and 9% below, rather than the usual 10% above and 10% below.
Pennsylvania Transformer Div, McGraw-Edison Co, Canonsburg, Pa.



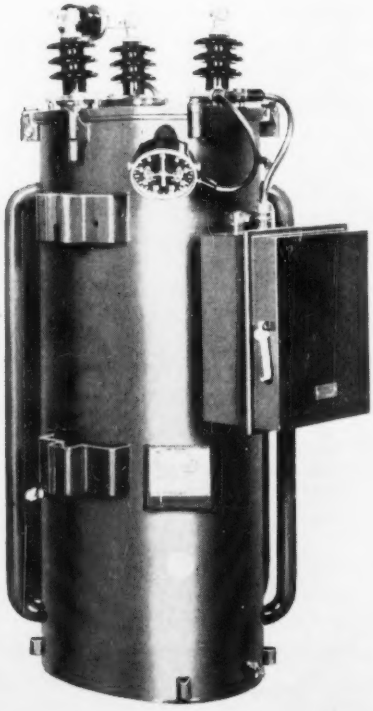
Oil Circuit Breakers . . .

. . . are available in new line for either indoor or outdoor service. Type FC breakers are offered in 7.2, 14.4 and 23-kv models for 600 or 1,200-amp service. The 3-phase units are self-contained and solenoid-operated. The operating mechanism is attached directly to the breaker in a plane normal to the three phases.
Cole Electric Co, 8439 Steller Drive, Culver City, Cal.

(*More New Equipment on page 58*)

Voltage Regulators . . .

. . . in three high-current ratings are additions to Type RSD pole-type, single-phase regulator line. New ratings are 300 and 400 amp, 2,500 v, and 219 amp, 7,620 v. Previously, 25 through 200-amp ratings were available. All RSD regulators are applicable on circuits rated 2,400 through 7,200 v delta or 2,400/4,160 through 7,960/13,800 v multi-grounded wye.
Line Material Industries, McGraw-Edison Co, Milwaukee 1, Wis.



Question:

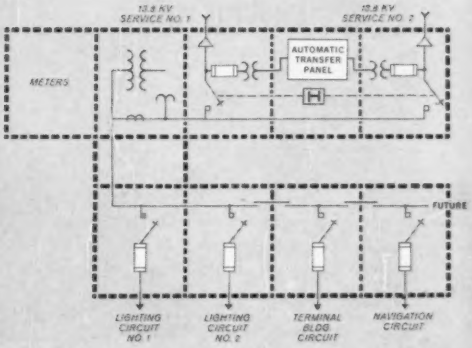
Why did Greater Cincinnati Airport use S&C Metalclad Switchgear in its high-voltage power system?

Answer:

There was *only one answer* to the requirements of maximum reliability, continuity of service, adequate short circuit protection, and full load switching, all at low cost —S&C Fused Load Interrupter Metalclad Switchgear.

Q: Why are power fuses and load interrupters used to replace circuit breakers in this type of switchgear?

A: Because conductors in such installations as this modern airport run in protected underground conduit and tunnels, and are not subject to transient faults caused by trees, wind, or rodents; protection against permanent faults is the only kind needed—and this is provided by S & C Power Fuses.



Q: How is automatic preferred-to-emergency transfer for service continuity provided in this S&C Metalclad Switchgear equipment?

A: By means of an S&C Standard Automatic Transfer Panel used with Moto-Draulic operator, a variety of throwover schemes is available at the flip of a switch. This transfer panel provides for making either source preferred; choice of automatic or manual return; choice of time delay (up to 10 minutes); and optional manual operation of line switches.

Q: Why can S&C offer savings up to 50% in this modern switchgear and still meet the highest standards of quality?

A: Because of the inherent simplicity of the S&C Fused Load Interrupter (compared to complex circuit breaker equipment), savings of 50% and more in the initial cost of switchgear equipment can be realized while the highest quality standards are maintained for the installation.

Q: How can you get information about such switchgear?

A: From S&C sales offices in principal cities. Consult your telephone directory.

S&C ELECTRIC COMPANY
4421 Ravenswood Ave., Chicago 40, Ill.

Specialists in High-Voltage Circuit Interruption for Electric Utilities Since 1910

Crapo

GALVANIZED STEEL STRAND FOR GUY, MESSENGER and OVERHEAD GROUND WIRE

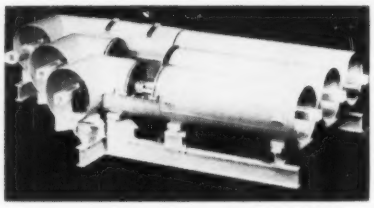
The high, uniform, consistently-dependable quality of Crapo Galvanized Steel Strand is the direct result of close laboratory control over each step in manufacture. All wires used in forming a particular size and grade are produced from steel of selected analysis, carefully processed under technical supervision and stranded on precision machines. Both wire and finished strand are subjected to prescribed laboratory tests to insure the desired end result.

Heavy, uniform, tightly-bonded zinc coatings, applied by the famous Crapo Galvanizing Process, provide maximum resistance to corrosion.

Write for booklet OG-25 containing "Sag and Tension Data for Overhead Ground Wire."

INDIANA

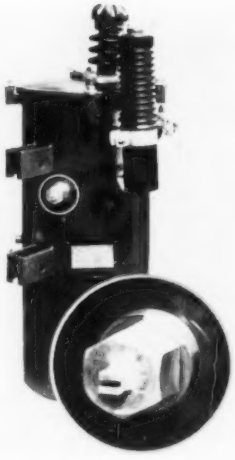
STEEL & WIRE CO., INC., Muncie, Indiana



Isolated Phase Bus . . .

. . . has round enclosures and single insulators at each conductor support station. It will withstand higher internal pressure than square enclosures. The bus eliminates the need for pressure relief because of its round enclosure and the absence of porous gaskets. Available in ratings of 14.4, 23 and 35 kv, with current ratings of 1,200 through 20,000 amp, the bus incorporates a "T" bar which prevents displacement of enclosures during short circuits. Conductors are aluminum.

General Electric Co, Schenectady 5, N. Y.



Transformer Switch . . .

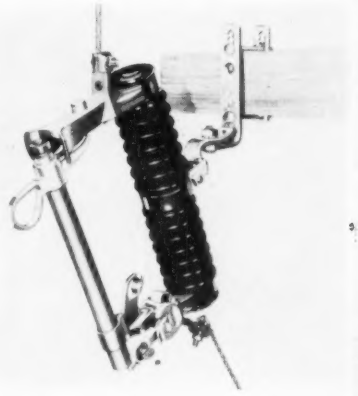
. . . allows increase of system voltage without changing transformers. Pole-type transformers from 5 to 167 kva, equipped with the externally-mounted switch, can be installed at a given line voltage and raised later. The cap, when removed and reversed, becomes the tool for rotating the switch mechanism. First position of the switch is a multiple connection. The second, for higher voltage changeover, is a series connection.

Kuhlman Electric Co, Birmingham, Mich.

Switchgear . . .

. . . has weather-protected housing designed to facilitate preventive maintenance of outdoor units during inclement weather. Called "Shelter-Clad" switchgear, the equipment has a 75-in. wide aisle for inspection or maintenance. This weatherproof work area, on a steel plate floor, makes it possible to check breakers without exposure to weather or requiring a transfer truck.

Allis-Chalmers Mfg Co, Milwaukee 1, Wis.



Cutouts . . .

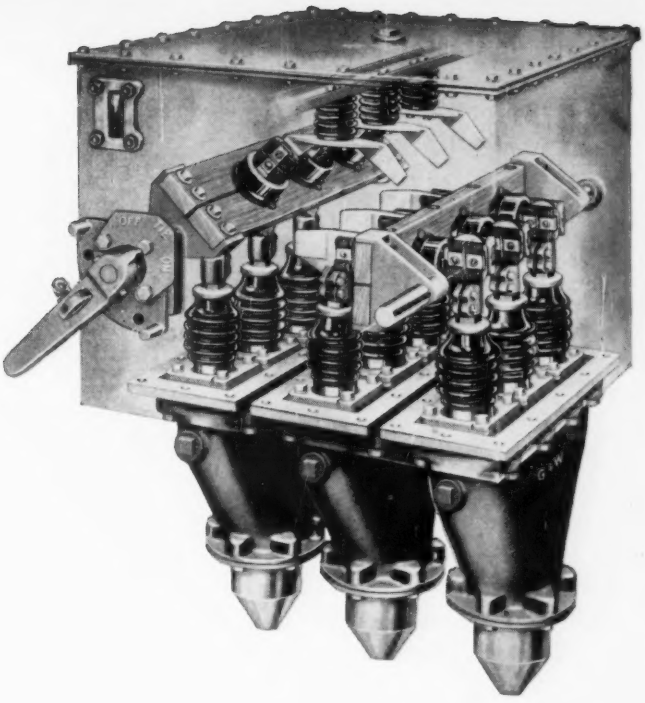
. . . have pressure controlled venting for interrupting both low and high fault currents. Low currents are cleared by venting the fuse tube at the bottom only. High fault currents cause a disk to blow out of the expendable cap on the top of the tube. Interrupting ratings of the Type GX are 10,000 amp at 7.8 kv; 8,000 amp at 15 kv. Load rating is 100 amp. The extra-heavy-duty cutouts are available on various mountings from 7.8 to 34.5 kv.

James R. Kearney Corp, 4236 Clayton Ave, St. Louis 10, Mo.

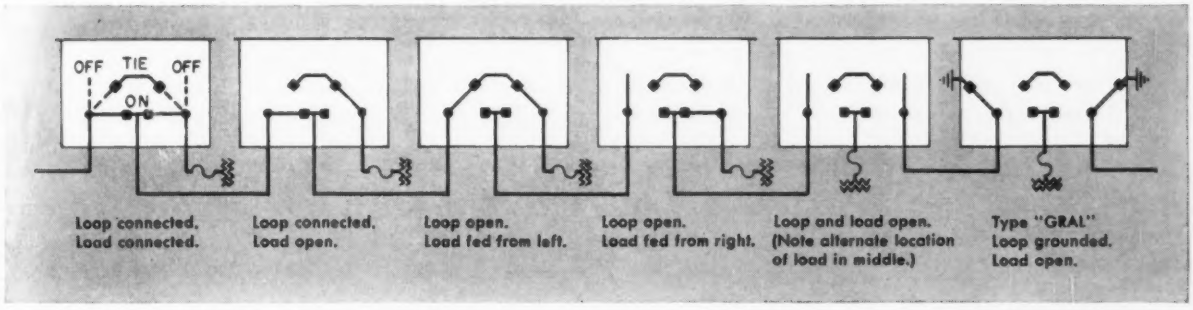
Battery Chargers . . .

. . . provide voltage regulation within $\pm 1\%$ over the full range from zero to full load despite input variations of as much as $\pm 10\%$. The silicon-rectifier units are controlled by a magnetic amplifier with a sensing control circuit that automatically maintains the proper charging voltage at the battery terminals.

(*Continued on page* 60)



low cost, unexcelled system flexibility


OFF
TIE
ON
OFF
Loop connected. Load connected.
Loop connected. Load open.
Loop open. Load fed from left.
Loop open. Load fed from right.
Loop and load open. (Note alternate location of load in middle.)
Type "GRAL" Loop grounded. Load open.

VOLTAGE CHARACTERISTICS

voltage rating	60 cycle withstand dry	impulse withstand 1½ x 40 wave
7.5kv	36kv	95kv
15.0kv	50kv	110kv
23.0kv	70kv	150kv
34.5kv	95kv	200kv

CURRENT CHARACTERISTICS

ampere rating	switch	amperes	
		momentary	4 seconds
400	standard	20,000	15,000
	special*	30,000	19,000
1000	standard	40,000	35,000
	special*	50,000	40,000

standard contacts silver plated
*silver inlaid contacts

Where maximum flexibility is demanded in a distribution system, the Type RAL oil switch has no equal. A few of the connections made possible with it are shown above.

The RAL load break oil switch is designed for three ways (two feeders and one load). The ways, links and tie buses are so compactly combined that only one RAL switch is needed to do the job of three conventional type switches. Costs are reduced accordingly—for equipment, installation time and space requirements. Maintenance expense is always far less for a quality product, too.

Standard RAL switches are made in 400 ampere (full load break) rated 600 volts, 7.5 kv and 15 kv. Special designs are made for 23 kv and 34.5 kv and for 1,000 amperes.

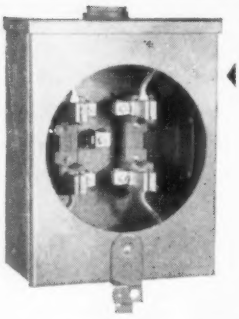
You can't afford to overlook the opportunity to learn more about this G&W switch. Contact a G&W representative about it today.

G&W ELECTRIC SPECIALTY COMPANY
3500 W. 127TH STREET • BLUE ISLAND, ILLINOIS

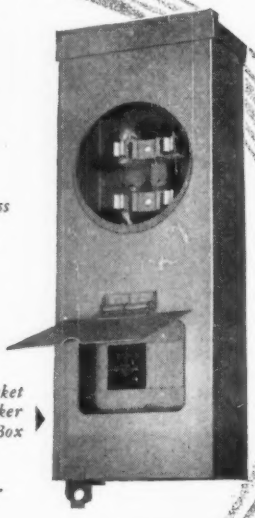
CANADIAN MFR. • POWERLITE DEVICES, LTD. • TORONTO, MONTREAL & VANCOUVER

D584

Look to Superior for
SOCKET EQUIPMENT



Ringless Meter Socket



Socket Breaker Box

Superior also offers a complete line of:
Test Switches Enclosures
Test Blocks

SUPERIOR
SWITCHBOARD & DEVICES CO.
CANTON, OHIO
A subsidiary of
The Union Metal Manufacturing Company

Catalog 55 offers complete information on features, services, types and sizes. Write to:

ESCO TYPE TS
MOTOR PROTECTION RELAY
PREVENTS MOTOR FAILURE FROM

Single-phasing; Motor Overload;
Voltage Unbalance; Low Voltage;

Without Any Unnecessary Interruption of Service.

Write for Technical Data, Prices and Delivery.

ESCO MANUFACTURING COMPANY
Electrical Power Distribution Apparatus
P. O. Box 1039, Greenville, Texas
Available in Explosion Proof Enclosures Ph. GL 5-6234

LAMP ANNUNCIATORS

Designed and manufactured to the exacting standards of the utilities industry. Catalog data available.

The H. R. KIRKLAND CO.
MORRISTOWN, N. J.
Established 1930
In Canada: H. R. KIRKLAND (CANADA) LTD.
4920 Western Avenue, Montreal, Quebec

You've got to put it into YOUR HEAD first before you can take anything from it. And reading is the quickest, surest way. In the Electrical Industry that's what Electrical World is for . . . to post you on events, new technology, problem-solving methods. Your name, residence address, and title on your letterhead will bring 52 weekly copies to your home. The cost: $6—no need to pay now.

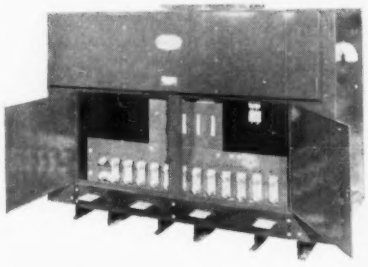
Electrical World
330 West 42nd Street, New York 36, N.Y.

Battery Chargers . . .

(*Continued from page* 58)

Both single and 3-phase units are available, having an output range of from 1 to 400 amp.

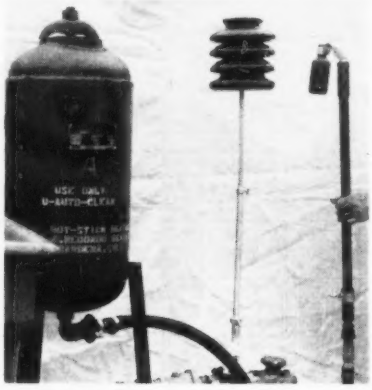
Exide Industrial Div, Electric Storage Battery Co, Rising Sun & Adams Aves, Philadelphia 20, Pa.



Transformer . . .

. . . acts as portable substation for emergency use. The Model 118 air-cooled, drip-proof transformer can be used on either single or 3-phase service with primary voltages of 4,800, 4,160 and 2,400 v, and secondary voltages of 208/120/240/480 v. Conduit is used for the high voltage inlet, and bus connections are available for secondary voltages. Two accessory outlets permit use of power tools or emergency lights. Offered in 225, 300 and 500 kva sizes, the units may be mounted on trucks or trailers.

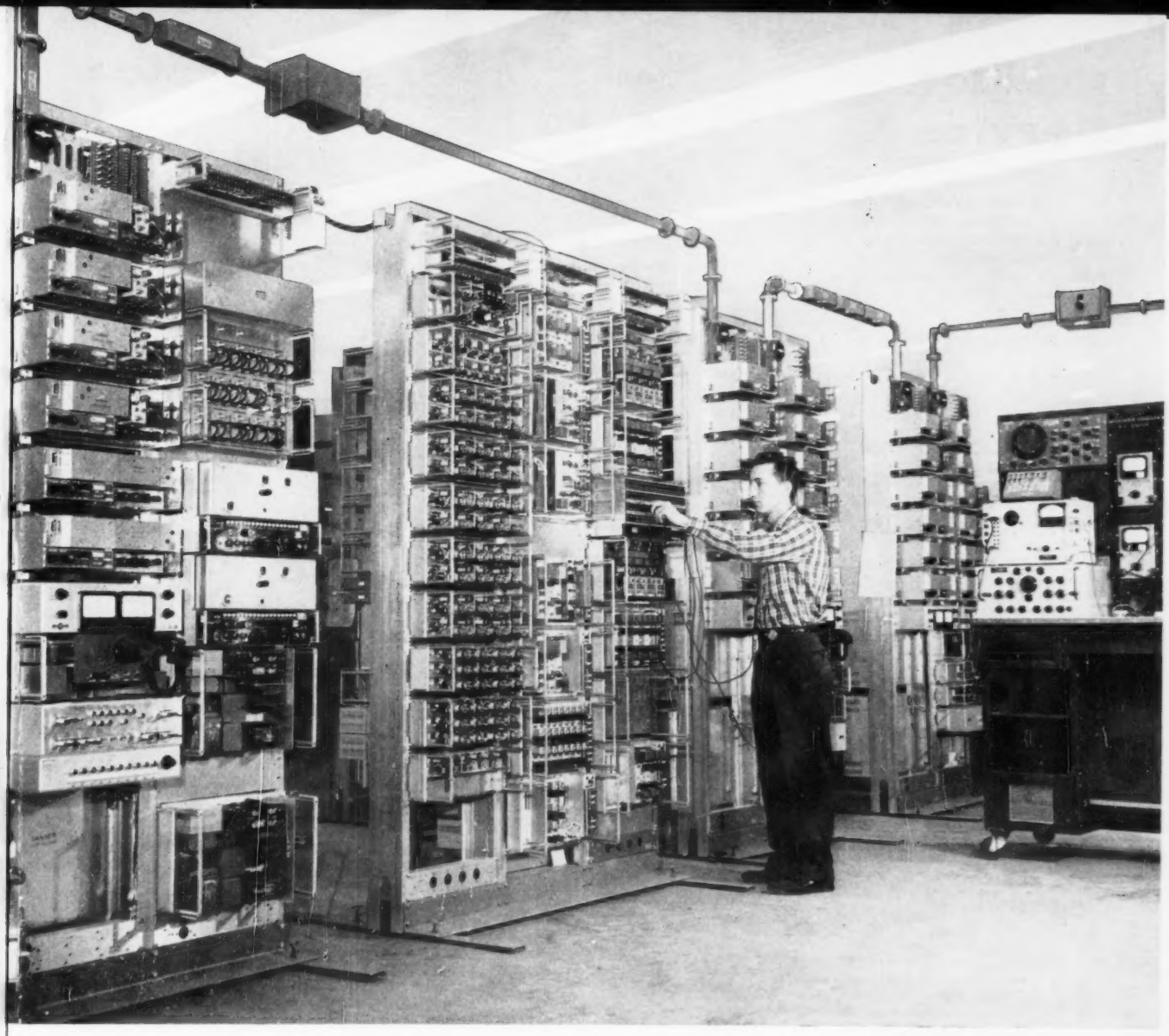
Magnatran, Inc, Box 211, Kearny, N. J.



Spray Cleaner . . .

. . . permits cleaning of insulators while line is energized. Application of a silicone gel spray is then possible, using the same device. Compressed air is dried, passed through

(*Continued on page* 62)



THIS MAN IS SAVING YOUR MONEY

One of the exceptional service features which saves time and money for every buyer of a Collins Microwave system is final floor testing. The completed system built by Collins is racked in the testing area. Units of the system which will be many miles apart in the final installation are connected by waveguide containing path-loss-simulators to approximate actual operating conditions. Data compiled during the testing is used by installation technicians, for a tremendous savings of installation hours.

Collins racks are assembled, wired, tested and shipped as a unit to each site ready for setting in place and going to work.

Your microwave dollar buys more service, more reliability, more flexibility and more value when you specify *Collins*. For complete information, write or call Microwave Sales Division, Collins Radio Company, 1930 Hi-Line Drive, Dallas 7, Texas.

COLLINS

COLLINS RADIO COMPANY • DALLAS • CEDAR RAPIDS • BURBANK

Reader Service

For additional information on new products, supplies, and services in this issue, the Manufacturers Editor of Electrical World offers his facilities. Check items in which you are interested in list below:

NEW EQUIPMENT

Penn Transformer . . . Transformer ☐
Cole . . . . . Circuit Breakers ☐
L-M . . . . . Regulators ☐
GE . . . . . Bus ☐
Kuhlman . . . . . Switch ☐
Allis Chalmers . . . . . Switchgear ☐
Kearney . . . . . Cutouts ☐
Exide . . . . . Battery Chargers ☐
Magnatran . . . . . Transformer ☐
Auto Hot-Stick . . . . . Cleaner ☐
Lang Developments . . . . . Trailer ☐
Salisbury . . . . . Applicator ☐

OTHER

Manufacturers Editor
Electrical World
330 W. 42nd St.
New York 36, N.Y.

* Note: Requests must be received within four weeks of publication date, accompanied by complete information specified. This service cannot be offered to readers in foreign countries or to competitive manufacturers.

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TITLE _____
DEPT. _____
COMPANY _____
ADDRESS _____
_____
_____

FOR:

Reference . . . . . ☐
Specs . . . . . ☐
Trial . . . . . ☐
Purchase . . . . . ☐

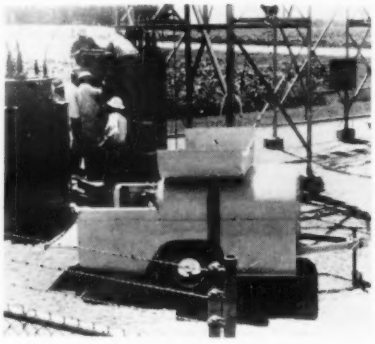
JANUARY 5, 1959

Spray Cleaner . . .

(*Continued from page 60*)

a non-conducting hose and then through the hot-stick. Cleaning and dressing solutions are available from the manufacturer.

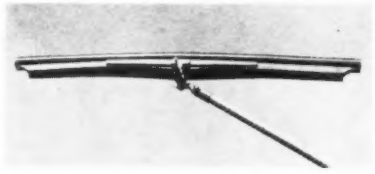
Auto Hot-Stick Rentals, Inc, 114 W Redondo Beach Blvd, Gardena, Cal.



Oil Testing Trailer . . .

. . . is easily transported to equipment locations. Equipment consists of a 300 gal oil storage tank, a 15 gpm light weight filter press, a dielectric oil tester and a portable 1,500-w motor generator. On-the-spot testing and filtering of transformer oil is possible.

Lang Developments Corp, 8701 W Fond du Lac Ave, Milwaukee 16, Wis.

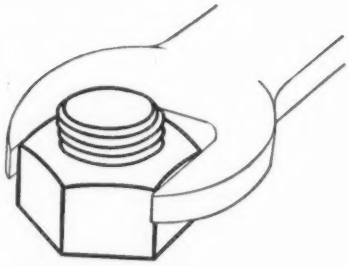


Ubangi Applicator . . .

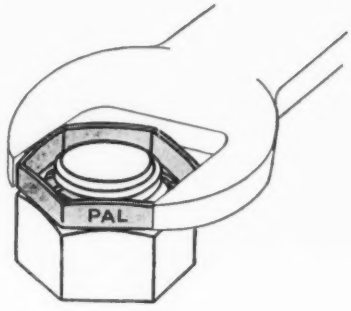
. . . enables one man to apply and remove Ubangi line hose, hoods, connectors and blankets. Hose and blankets are applied and removed using applicator blades, while connectors and hoods are handled by inserting the prong through holes in lugs on the top of both devices. The applicator is equipped with 24-in. blades for use with hose up to 4½ ft long, or with blades 36-in. long to handle 5 or 6-ft hose lengths.

W. H. Salisbury & Co, Morgan at Kinzie St, Chicago 22, Ill.

Get it tight—



then KEEP it tight



with a

PALNUT LOCK NUT

JUST spin on a PALNUT Lock Nut and lock with 1/3 turn of a wrench. Takes but seconds, cost is negligible, protects for the life of the installation. PALNUT Lock Nuts exert a double locking action that prevents the plain nut from loosening and the bolt from backing out, under severest vibration. Eliminates further checking or re-tightening on mechanical assemblies —maintains perfect conductivity on electrical connections.

Widely Used Throughout Utility Field

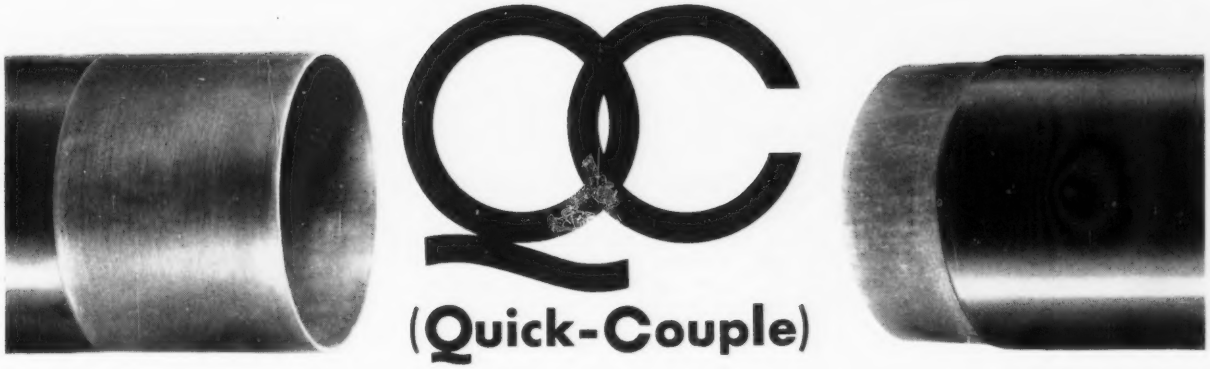
PALNUT Lock Nuts have been used for years on wood poles, steel towers, fittings, connectors, switches, hardware, transformers, etc. Complete range of sizes, in all finishes and materials used by utility industry. Get Bulletin #577.

THE PALNUT COMPANY

51 Glen Road
Mountainside, N. J.

PALNUT
TRADE MARK
LOCK NUTS
for quick, secure fastening at low cost

FOR REALLY FAST INSTALLATION



BERMICO® CONDUIT

Long a boon to electrical engineers, contractors and utilities, world-famous Bermico Conduit now comes with a built-in feature of extraordinary added advantage to old customers and new ones.

It is called Bermico Q-C Conduit. The new feature—*built-in flush couplings, already attached, at no added cost!*

Bermico Q-C (Quick-Couple) Conduit now brings these plusses:

1. Assembly time slashed because separate couplings are eliminated.

2. Matching interior and exterior tapered ends permit instant joining with a few hammer taps.

3. No separate couplings to ship, no cartons to handle.

4. Q-C Conduit loads and stores in even, level stacks.

5. No cutting and staggering of joints needed, even for narrow trenches.

Bermico Conduit is light, strong, uniform. It is made of cellulose fibre impregnated with high-molecular-strength coal tar pitch. It is waterproof, strongly resistant to soil acids and alkalies, and of high dielectric strength. Smooth interior simplifies cable pull-through. In event of cable failure, it permits easy pullout and replacement of conductors.

Bermico Q-C Conduit comes in 8′ lengths and in diameters from 2″ to 4″. Bermico Conduit in 4½″, 5″ and 6″ diameters is available with standard couplings. For savings, always specify Bermico Q-C Conduit.

Distributed by WESTINGHOUSE Electric Supply Company and Agent Jobbers Offices in principal cities

BROWN COMPANY

General Sales Offices: 150 Causeway St., Boston 14, Mass.
Mills: Berlin, N. H. and Corvallis, Ore.

Florida Power Cops LBE Contest

Mrs. Amy Thompson, home service director for Florida Power Corp accepts a framed original *Saturday Evening Post* cover as first prize in the 1958 Live Better Electrically Kitchen Tour award program. Florida Power was judged as having developed the most effective tour program last year. The Post cooperated with LBE in the judging.

The tours were co-sponsored by utilities and local charities. Groups of women were taken on tours of actual kitchens, either those of local prominent families or kitchens of typical housewives. Proceeds went to the charities.

Shown in the photo are, left to right: J. S. Gracy, Florida Power vice president; Carlo Vittorini, SEP; Mrs. Thompson; and Helen Kirtland, consultant-women's interests, LBE.

Loyd Dunning, LBE's supervisor-trade programs, is credited with the basic concept for the kitchen tours.

The rest of the winners will be announced at the LBE Women's Conference this month in Chicago.

SEE Confers on Utility Problems

The Southeastern Electric Exchange held its General Sales Conference in Atlanta, Ga. on Nov. 12-14. A report on the General Sessions was carried in last week's Electrical World. The following facts were uncovered in the committee sessions.

• If the families in the $4-7,000 income bracket spend the money that they have available after rent, food and clothing are paid for on six small appliances the potential E.A.R. for utilities would be over $309 million.

• By combining the sale of ranges, water heaters and dryers on a yearly accumulated basis, Gulf States Utilities offers dealers incentive that works for plus business. It maintains dealer interest throughout the entire year rather than just during campaign periods.

• The best results in selling electric heating are obtained when an aggressive distributor puts a qualified heating sales engineer in the field and has him devote his full time to the sale of electric heating.

• Materials handling on farms will soon be changed. Rather than lifting, pulling and pushing millions of tons of eggs, milk, hay and vegetables, farmers will be relying on electric motors.

• Central pole metering at the approximate load center of farms has been adopted by two utilities. Duke Power Co will install the meter at the delivery pole and necessary overhead wiring from there to the residence and buildings when original service is installed. Presently Georgia Power Co has the customer provide the point of attachment, but the company is experimenting by setting a suitable pole, when working in the area, and billing the customer $10 toward the cost.

• To maintain the present standard of living at the present rate of improvement, the nation's "work force" must produce 40% more goods and services in 1965 than it does today. To do this the electric power at the disposal of all workers will have to be increased 471 billion kwhrs for industry alone.

• An industrial salesman needs to recognize not only the substitution of electric service for an existing method, but also opportunities for new products or how a new approach may be made to manufacture the same product that will result in more net profits and a better and more efficient installation.

• To determine the effectiveness of advertising: Directional microphones can be hidden in model homes to record visitors' comments; effectiveness of TV messages can be measured by broadcasting special messages and phoning viewers before and after the broadcast.

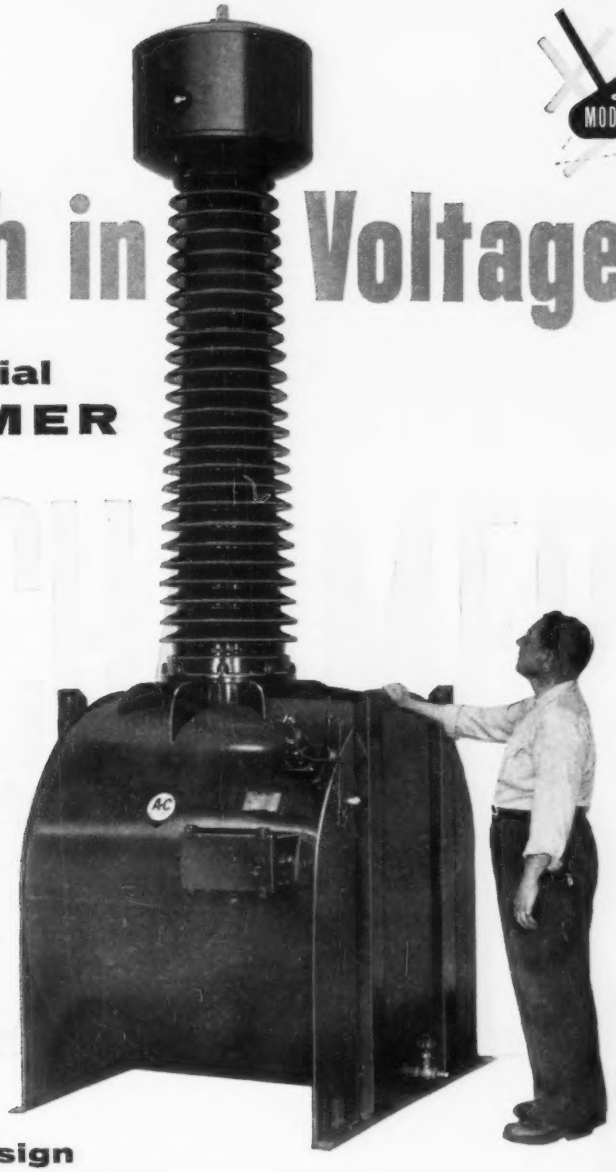
• Public relations problems can be avoided and valuable information obtained by executing a program after the transmission line has been placed in operation. A carefully prepared program of inspection and maintenance will help capture the good will of the neighboring customers.

"Once electric heating is freed from the false atmosphere of exorbitantly high cost, the rate of acceptance is up to us."—T. B. Knox, director-industrial sales, Virginia Electric Power Co.

Plan to stay ahead... MODERNIZE!

New High in Voltage

230-kv potential TRANSFORMER



compact design reduces weight 60%

The new Allis-Chalmers 230-kv instrument transformer marks a new high in voltage for potential transformers using modern design principles. This compact design, which includes the application of better insulating materials and eliminates the use of oil-filled condenser type bushings, results in a weight reduction of 60% less than possible in conventional construction.

Advanced corona-free design in tank and bushing

The entire line of Allis-Chalmers potential transformers, from 24 kv through 230 kv, can withstand long voltage stresses and short-time surge conditions. Internal corners and coil edges are protected by formed insulating channels which fit close to coil surfaces — effectively prohibiting formation of corona and the development of leakage paths. The one-piece high voltage porcelain bushing, integral with the primary winding, incorporates the same corona-free design features used in the transformer.

Easy handling, simplified installation, improved performance in ratio and phase angle, hermetically sealed tanks for less maintenance — for the details of all these features and advantages, contact your A-C man, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

A-C ALLIS-CHALMERS

A-5833

LOISEAU PERSON VIRTUE HOWELL

Top-Level Changes Made at PS of Colorado

John E. Loiseau, president, has been elected chairman of the board of Public Service Co of Colorado. Robert T. Person, executive vice president, was chosen president.

The duties of William D. Virtue, executive vice president, have been enlarged to executive vice president in charge of company operations. He will continue as treasurer and principal financial officer. Walter W. Howell, assistant vice president, has been named vice president and principal accounting officer, succeeding Virtue.

Loiseau began his utility career in 1915 when he took charge of the accounting department of the Citizens Gas, Electric, & Heating Co, Mount Vernon, Ill. He next served with the Mansfield Light & Power Co in Ohio and with Montgomery Light, Water, & Power Co of Alabama.

He joined Public Service of Colorado as secretary and director in 1923 and was elected vice president in 1938. He served the company as principal finance and accounting officer until 1943 when he was named president.

Person started his career in Albuquerque, N. M. in 1936. His executive positions in the utility field include six years as vice president and general manager of the Pueblo, Colo. Gas & Fuel Co, a Public Service of Colorado subsidiary.

He was elected vice president of Public Service in 1956 and a company director in 1957. In 1958, he was elected executive vice president.

Virtue is a 39-year veteran of the company and has been vice president and director since 1943. In that capacity he was the company's principal finance and accounting officer. He was elected treasurer in 1953 and an executive vice president in 1958. He is a member of the Controllers Institute of America, American Gas Assn. and Edison Electric Institute.

Howell started with Public Serice of Colorado in 1924, and has served as assistant secretary, and assistant treasurer. He was named assistant vice president in 1957.

Ayer Elected Head of Suburban Electric

Harold E. Ayer, president of Lynn Gas & Electric, has become president of the Suburban Electric Co, Malden, Mass. He will continue as president of Lynn G&E. Both utilities are subsidiaries of the New England Electric System.

Ayer joined Lynn Gas & Electric in 1934 as a power sales engineer. He next became assistant to the general manager. In 1955, he was named vice president in charge of operations and in 1956 was elected exectuive vice president. He became president in March, 1958.

A native of Claremont, N. H., he is a graduate of Norwich University with a degree in electrical engineering. His civic duties include director of Essex Trust Co, and serving on Board of Managers of Lynn Hospital.

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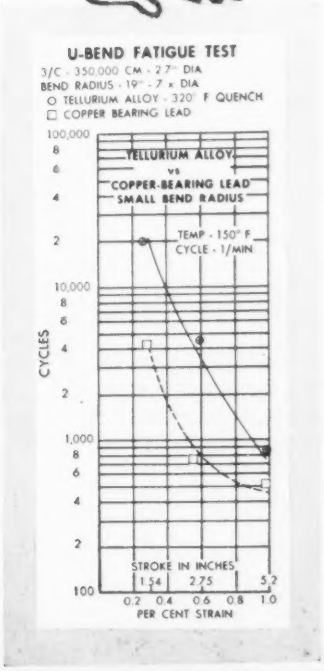

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Mexico Power Program (*Continued from page 28*)

league, Mexlight, Impulsora serves 385,000 consumers spread over 17 of Mexico's 29 states, including 400 cities, towns and villages.

Generating units were started in 1899 with a 1,500-kva Westinghouse water-driven turbine near the town of Puebla. The station was owned by another company which was taken over by A&FP along with other little, independent companies at later dates.

Pioneered in Transimssion

A&FP really got a boost during the silver boom days in the early part of the century in Guanajuato State. The company claims it was the first in the world to build a 60-kv transmission line and to build lines on steel towers (previously in pumping stations) around 1903.

Ever since, A&FP and its Mexican subsidiaries have generated and distributed power for the country's hinterland, mostly for mining, agriculture, small industries and small town populations.

According to David H. Matson, president of Impulsora, company operations come under the control of Impulsora (a service company), Cia. Nacional (a holding company) and five operating companies, two of which are city power companies in Tampico and Merida.

Matson says one of the company's most important areas is the Puebla-Vera Cruz system which is run by the Southeast Division (Cia. Electrica Mexicana de Sureste S.A.). Matson and government officials, this month, inaugurated a new 33-Mw unit in Puebla (total steam plant capacity, 40.5 Mw) and also put on the line steam plants in Celaya and Durango State.

Today, like Mexico City in the early 1950s, many of Mexico's interior towns are beginning to catch their own industrial or agricultural booms. Impulsora's companies now have an installed capacity of 292 Mw. This will be upped to more than 500 Mw by 1963.

Impulsora has a definite program to spend around $200 million in the next ten years. Major financing agents for Impulsora's programs so far have been Export Import Bank and Nacional Financiera.

Matson says his company, unlike Mexlight, has little interest in hydro for the future. He claims that there are few good water sources left in Impulsora's territories and what is left is in government hands.

Impulsora, sticking to thermal-generating expansion, has two 100-Mw plants planned for Chihuahua, Leon and Guanajuato. Meanwhile, the company uses a small fleet of 5-Mw mobile gas-turbine railroad units to cover interior shortages until expansion projects are done.

Impulsora is working on a public relations experiment in Puebla. If it goes according to plans, it will be used in other countries where AF&P operates. Trained company men make a "deep" survey of everything to do with electricity in the town, via door-to-door canvassing. Statistics and findings are analyzed by UNIVAC. Then, well-known townspeople are hired to make appointments with house-owners and industrial people for talks with Impulsora's staff about appliance, wiring or machinery problems.

It was learned that 24% of those interviewed in Puebla had TV, but only 12% had any kind of refrigeration. Impulsora then put on an appliance fair with local dealers and sold about 200 refrigerators. Nearly 1,000 appliances were sold, or orders taken.

Search for New Energy Sources

With such new demand for power, with Mexico City growing in leaps and bounds, with half of Mexico's 33-million population without electricity, and with an unprecedented industrial boom already in full swing, Mexico's power companies will be sucking up every available source of energy to run new turbines.

Where will future energy come from? Right now oil is cheap but prices will be going up this year. There will be a trend toward transforming present oil-burning stations to natural gas as Mexico hooks up with its gas fields in the Southeast. The use of natural, volcanic steam may come if FEC experiments in volcanic beds near Mexico City work out. A push will come toward the big rivers in southeastern jungles and, finally, the use of her big uranium reserves in A-power.

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The Meetings Calendar

JANUARY - 1959

International Home Furnishings Market — The Merchandise Mart, Chicago, Ill., Jan. 5-16.

Third Annual LBE National Women's Conference—Edgewater Beach Hotel, Chicago, Ill., Jan. 8-10.

Edison Electric Institute—Industrial Power & Heating Group, Atlanta, Ga., Jan. 15-16.

Joint Edison Electric Institute Industrial Relations Committee and Personnel Practices Committee of the **Pennsylvania Electric Association**—Carlton House, Pittsburgh, Pa., Jan. 15-16.

Oklahoma Utilities Association — Accounting Section Conference, Biltmore Hotel, Oklahoma City, Oklahoma, Jan. 16.

Pennsylvania Electric Association — Communications Committee, Hotel Pick-Roosevelt, Pittsburgh, Pa., Jan. 22-23; System Operation Committee, Fort Stanwix Hotel, Johnston, Pa., Jan. 29-30; Structures and Hydraulics Committee, Benjamin Franklin Hotel, Philadelphia, Pa., Jan. 29-30.

Power & Communications Contractors Association—14th Annual Convention, Shamrock Hilton, Houston, Texas, Jan. 25-27.

Canadian Electrical Association—Eastern Zone Section Meetings, Chateau Frontenac, Quebec, P. Q., Canada, Jan. 26-29.

American Society of Heating & Air-Conditioning Engineers—14th International Heating & Air-Conditioning Exposition, Convention Hall, Philadelphia, Pa., Jan. 26-29.

Doble Clients Conference — 26th Annual Meeting, Sheraton Plaza Hotel, Boston, Mass., Jan. 26-30.

Midwest Welding Conference—5th Annual Conference sponsored by Armour Research Foundation of Illinois Institute of Technology and the Chicago section of the American Welding Society, Chemistry Building, Illinois Tech campus, Jan. 28-29.

Public Utilities Advertising Association — Regional Meeting, Timberline Lodge, Portland, Oregon, Jan. 29-30.

FEBRUARY

American Institute of Electrical Engineers—Winter General Meeting, Statler and Sheraton-McAlpin Hotels, New York City, Feb. 1-6.

American Society for Testing Materials—Committee Week Meeting, Penn-Sheraton Hotel, Pittsburgh, Pa., Feb. 2-6.

Edison Electric Institute — Prime Movers Committee, Hotel Beaumont, Beaumont, Texas, Feb. 2-4; Transmission & Distribution Committee, Morrison Hotel, Chicago, Ill., Feb. 12-13; EEI-AGA Accounting Conference, Final Working Committee, Lord Baltimore Hotel, Baltimore, Md., Feb. 16-17; Electrical System & Equipment Committee, Atlanta Biltmore Hotel, Atlanta, Ga., Feb. 16-17.

Pennsylvania Electric Association—Transmission & Distribution Committee, Hotel Benjamin Franklin, Philadelphia, Pa., Feb. 5-6; Prime Movers Committee, Hotel Pick-Roosevelt, Pittsburgh, Pa., Feb. 12-13; System Planning Committee, Hotel Bellevue-Stratford, Philadelphia, Pa., Feb. 16-17; Electrical Equipment Committee, Hotel Benjamin Franklin, Philadelphia, Pa., Feb. 19-20; Relay Committee, Hotel Pick-Roosevelt, Pittsburgh, Pa., Feb. 26-27.

Missouri Valley Electrical Association—Industrial and Commercial Sales Conference, President Hotel, Kansas City, Mo., Feb. 5-6.

National Association of Purchasing Agents—Public Utilities Buyers Group Mid-Winter Meeting, Chase Hotel, St. Louis, Mo., Feb. 8-10.

National Electrical Week—February 8-14.

National Rural Electric Coop Association — Annual Meeting, Shoreham and Sheraton-Park Hotels, Washington, D. C., Feb. 9-12.

American Society of Civil Engineers—Los Angeles Convention, Los Angeles, Calif., Feb. 9-13.

Pacific Coast Electrical Association — Business Development Conference, Hotel Sheraton-Palace, San Francisco, Calif., Feb. 12-13.

American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc—Annual Meeting, Hotels St. Francis, Sheraton-Palace, Sir Francis Drake, San Francisco, Calif., Feb. 15-19.

Electrical Trade Conference & Exposition — Sheraton Park Hotel, Washington, D. C., Feb. 17-19.

American Public Power Association—Engineering & Operations Workshop, Springfield, Illinois, Feb. 19-20.

• **National Society of Professional Engineers**—Winter Meeting, Dinkler-Tutwiler Hotel, Birmingham, Ala., Feb. 19-21.

• **California Municipal Utilities Association**—Annual Conference, Berkeley, Calif., Feb. 24-27.

• **Public Utilities Advertising Association**—Regional Meeting, New Haven, Conn., Feb. 26-27.

• **National Wiring Sales Conference**—Jung Hotel, New Orlents, La., Feb. 26-27.

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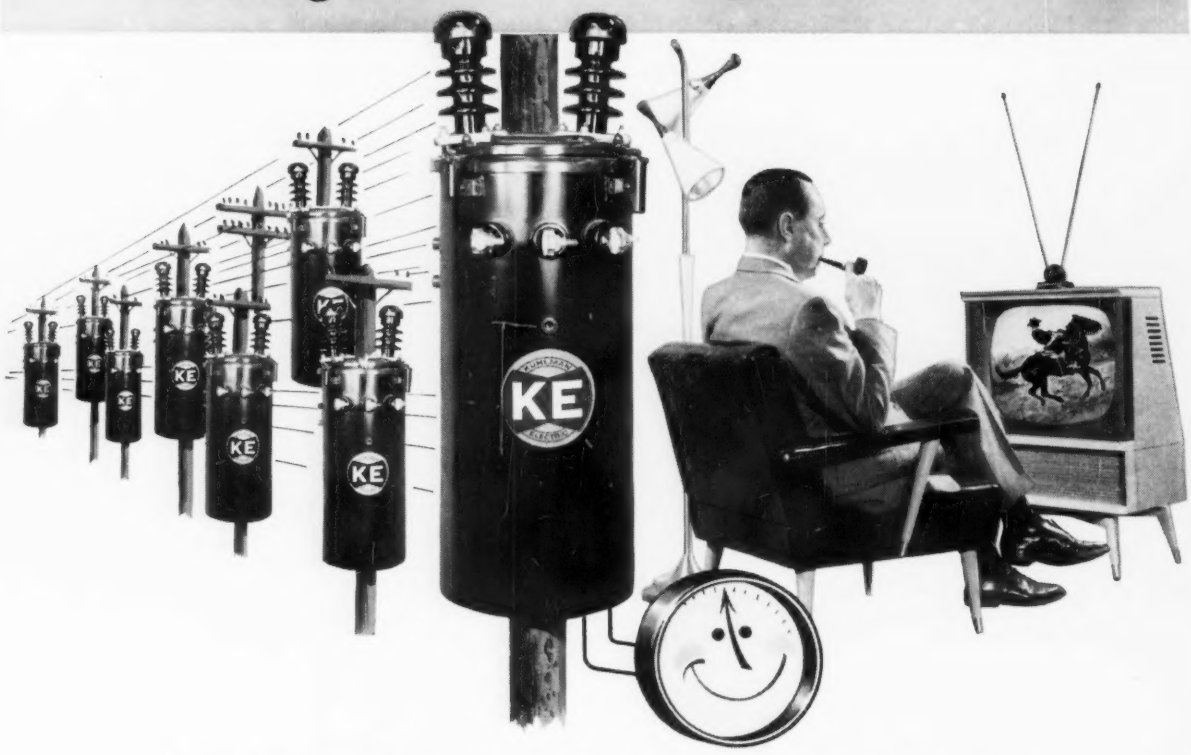

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